Eighth Annual JAT Contest for New and Aspiring Translators
(Japanese to English)

Source Text

超臨界水酸化法を用いた感染性医療廃棄物の新規オンサイト処理システムの開発

The translations of award winners and finalists

E5 (First place: Richard Mehurst) E16 (Second place: Rachel Spangaro)

E20 (Dianne Kirk) E26 (Whitney Matthews) E29 (Joseph Odel)

Commentaries from the Judges

James Davis Malcolm James Ken Wagner

E5

MS Environmental Systems, March 2008

Development of a New On-Site Treatment System for Infectious Medical Waste Using Supercritical Water Oxidation

66760 Ryo Tachino (Advisor: Professor Yoshito Oshima)

Key words: supercritical water oxidation, medical waste, continuous flow reactor, two-stage treatment process*

1: Introduction

In recent years a wide range of different kinds of medical waste is being produced, due to advances and diversification in medical technology, and separating, storing, and disposing of this waste is becoming an increasing financial burden for many medical facilities. Disposable plastic equipment, including syringes, catheters and IV infusion sets, makes up 40% of medical waste,1 but there is a need for proper treatment of infectious waste soiled with blood or other body fluids, and sharp, hazardous waste, such as hypodermic needles, scalpels, and broken glass. Currently over 95% of medical facilities outsource disposal,2 but insufficient communication concerning risk between waste producers and disposal workers is not uncommon, and there are problems with infection both inside and outside facilities, such as needlestick injuries during storage and transportation, as well as the risks that accompany improper treatment or illegal dumping by unethical agencies. To minimize these risks, it is desirable that medical waste producers responsibly and quickly detoxify their waste at its point of origin.

In this study a new on-site detoxification system, using supercritical water oxidation (SCWO), is proposed as an intermediate treatment method for infectious medical waste, as an alternative to incineration by outside agencies. Within this system, SCWO allows for simultaneous decomposition of medical waste and sterilization of infectious material, making possible a significant reduction in infectious waste. Further, as there is no need to separate the many different kinds of medical waste (syringes, vacuum blood collection tubes, etc.), infection during the sorting process can be minimized. It has been demonstrated that it is possible to achieve complete oxidative decomposition of polypropylene in a 20-minute reaction at supercritical conditions of 450°C and 25MPa, as well as detoxification and sterilization of E.coli bacteria,3 but if we envisage actual use of this process at medical facilities, designing a compact but powerful treatment system is essential.

This study focuses on such typical kinds of infectious waste as disposable syringes and vacuum blood collection tubes, and investigates through experiments the development of a treatment process for them without removing hypodermic needles or metal parts, with the aim of producing a compact treatment device.

2: Medical Waste Decomposition Experiments Using a Batch Reactor

(1) Experimental Method

As a way of checking that medical waste decomposition using SCWO is possible, experiments were carried out in a batch reactor on a syringe with a hypodermic needle attached, and a vacuum blood collection tube. The equipment used was a polypropylene all-plastic syringe (Henke Sass Wolf, NORM-JECT, 2ml) and an SUS304 hypodermic needle (Terumo, Terumo needle, 20g x 1.5 inch), as well as a vacuum blood collection tube (Terumo, Venoject II) containing a serum separating medium (a 0.109mol/L trisodium citrate buffer solution).

In separate experiments, a syringe with attached needle (total weight 1.5g) and a vacuum blood collection tube (total weight 8.6g), were put into an Inconel 625 batch reactor (volume 690ml) with 75.4ml of hydrogen peroxide solution added as an oxidizing agent. After taking approximately 30 minutes to increase the temperature from room temperature to 450°C using a high-frequency induction furnace (Suzuki Shoko Co Ltd), supercritical conditions of 450°C and 25MPa were maintained for 20 minutes. Cooling to room temperature after the reaction was complete took about 6 hours.

Further, in order to test the effects of chlorine contained in blood, experiments were carried out on the decomposition of syringes using saline (0.9% sodium chloride solution) as a substitute for blood. A 0.1g syringe fragment and a 3cm hypodermic needle were put together with saline in an SUS316 batch reactor (volume 10ml). The reactor was then immersed in a sand bath and brought to a temperature of 450°C and a pressure of 25MPa for periods of between 5 and 30 minutes (in separate experiments), before the reaction was stopped by immediate immersion in coolant water.

In all experiments the total organic carbon concentration level of the remaining liquid was measured using a TOC analyzer (Shimadzu, TOC 5000A) with TOC concentration levels and conversion rates used as indicators of decomposition.

(2) Results and Discussion
Figure 1 shows the contents of the reactors before and after the SCWO treatment method was used on a syringe with a needle attached, and a blood collection tube. After decomposition of the syringe there was no solid residue, excluding the needle, with only liquid remaining. The TOC conversion rate of this residual liquid was over 99.8%, suggesting that using the SCWO method it is possible to almost completely decompose a syringe while the needle is still attached. On the other hand, in the case of the blood collection tube, the TOC concentration level after the experiment was fairly high at 453mg/L, and approximately 12mg of inorganic solid matter deriving from pharmaceuticals and the metal film stopper remained after decomposition. It’s thought that if enough oxidizing agent is added, and attention is paid to the removal of solid residue, it will be possible to achieve similarly complete disposal with blood collection tubes as with syringes.

Translator’s Note
* These key words were in English in the original document. The ‘continuous flow reactor’ and ‘two-stage treatment process’ do not appear in the translated sections of the paper given above.

E16

Thesis for completion of a major in Environmental Systems, March 2008
Development of a new onsite processing system for infectious medical waste using supercritical water oxidation
66760 Ryo Tachino (Supervisor: Prof. Yoshito Oshima)

Key words: Supercritical water oxidation, Medical waste, Continuous flow reactor, 2-stage treatment process

1. Introduction
In recent years, advances in and diversification of medical technology have resulted in the generation of various medical waste, with many medical institutions shouldering an increasing economic burden for its separation, storage, and disposal. Disposable plastic instruments such as syringes, catheters, and transfusion sets comprise approximately forty percent of medical waste, but appropriate disposal is also required for infectious waste contaminated with blood or bodily fluids, and sharps and injurious waste such as injection needles, scalpels or broken glass. While processing is currently outsourced at over ninety-five percent of medical institutions, insufficient risk communication with the disposal company is not uncommon, contributing to the risk of problems such as hospital-related infections due to needlestick injuries during storage and transport of waste, and improper handling or illegal dumping of waste by underhanded companies. Onsite processing whereby the waste generator swiftly and responsibly detoxifies the waste at the place of generation is desirable to minimise these kinds of risks.
This study presents a new onsite detoxification processing system using supercritical water oxidation as an intermediate processing method for infectious medical waste, to replace outsourced incineration processing. Use of the supercritical water oxidation method in this processing system allows simultaneous breaking down of medical waste and sterilization of infectious material, enabling a significant volume reduction of infectious waste. Further, as separation of the multiple components of medical waste, including syringes and vacuum blood collection tubes is unnecessary, it is also expected to minimise infection during separation work. While it has previously been demonstrated that supercritical conditions of 450°C/25 MPa cause polypropylene to undergo a complete oxidative decomposition reaction in twenty minutes, and that sterilization of Escherichia coli, including detoxification , is possible, a processing system design that is compact and has processing capability is essential when hypothesizing its application to the actual waste generation site.
This study focused on disposable syringes and vacuum blood collection tubes—typical infectious waste items—to undertake an experimental investigation into the construction of a process that enables disposal without the removal of needles and metal components, with the aim of producing a small processing unit to dispose of model waste.

2. Medical Waste Decomposition Experiments using Batch Reactors

(1) Method

To confirm the possibility of decomposing medical waste using supercritical water oxidation, an experiment was conducted in which syringes with needles attached and a vacuum blood collection tube were processed using a batch reactor.

The medical instruments used were a polypropylene all plastic syringe (Henke Sass Wolf, NORM-JECT 2 mL), a SUS304 syringe (Terumo, Terumo Syringe 20 G x 1½”), and a vacuum blood collection tube (Terumo, Venoject II) containing a serum separating medium (a buffer solution containing 0.109 mol/L of sodium citrate).

The syringes with needles attached (total weight 1.5 g) and the blood collection tube (total weight 8.6 g), were enclosed in an Inconel 625 batch reactor (690 mL capacity) with 75.4 mL of hydrogen peroxide added as an oxidizing agent. A high frequency induction heating furnace (Suzuki Shoko) was used to raise the temperature over approximately thirty minutes from room temperature to 450°C, after which supercritical conditions of 450°C/20 MPa were maintained for twenty minutes. Approximately six hours was required for the temperature to cool to room temperature after completion of the reaction. Also, in order to investigate the influence of the chlorine content in the blood, a syringe decomposition experiment was conducted using a physiological saline solution (0.9% sodium chloride solution) as a blood analog. A syringe fragment weighing 0.1 g and 3 cm of needle were enclosed in an SUS316 batch reactor (10 mL capacity) together with a diluted physiological saline solution. This reactor was immersed in a sand bath and heated for 5 to 30 minutes at 450°C/25 MPa, then promptly immersed in cooling water upon completion to stop the reaction.

In each of the experiments, the total organic carbon (TOC) concentration in the residual liquid after the reaction was measured using a TOC analyser (Shimadzu Corporation, TOC-5000A), and the TOC concentration and TOC conversion ratio were set as decomposition indices.

(2) Results and Discussion

The contents of the reactor before and after the reaction in which a syringe with needle attached and a blood collection tube were processed using supercritical water oxidation are shown in Fig. 1. With the exception of the needle, there was no solid residue remaining after decomposition of the syringe, with only liquid content recovered. The TOC conversion ratio of the residual liquid was over 99.8 percent, suggesting that a syringe with its needle still attached can be almost completely decomposed using supercritical water oxidation processing. However, in the case of the blood collection tube, the residual TOC concentration was fairly high at 453 mg/L, and the metal film seal and approximately 12 mg of drug-derived inorganic solids remained after decomposition. For decomposition processing of blood collection tubes, it is thought that paying attention to the separation and removal of solid residue in addition to adding adequate oxidizing agents should make processing of whole units possible as with syringes.

E20

Submitted in March 2008 in fulfillment of requirements for a Graduate School degree in Environment Systems

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(Supervised by Professor Yoshito Oshima)

Development of a Novel On-Site Treatment System for Infectious Medical Waste Using Supercritical Water Oxidation

Key words: Supercritical water oxidation, Medical waste, Continuous flow reactor, 2-stage treatment process

1. Introduction

In recent years, due to advances and diversification in medical technologies, a wide variety of medical waste is now being generated, leading to increased financial burdens for many medical facilities associated with the separation, storage and treatment of medical waste. Approximately 40% of medical waste is comprised of disposable plastic devices such as syringes, catheters and infusion sets,1 which has given rise to a need for appropriate and concurrent treatment of infectious waste contaminated with blood, bodily fluids and similar materials, and sharp waste that can cause injuries, such as hypodermic needles, scalpels and damaged glass. Currently, over 95% of medical facilities send waste off-site for treatment,2 but in many cases there is insufficient communication of risks between waste generators and the operators treating the waste. This leads to risks of infections being transmitted outside hospitals by means such as needlestick injuries during storage and transportation, and to improper treatment and illegal dumping by unscrupulous operators. To keep such risks to a minimum, it is desirable for generators of medical waste to take responsibility for the prompt detoxification of the waste at its point of origin (on-site).

In this study, by way of an alternative to treatment by incineration at external facilities, a novel on-site detoxification and treatment system using supercritical water oxidation is proposed as an intermediate treatment method for infectious medical waste. Using this treatment system, it may be possible to greatly decrease the volume of infectious medical waste by being able to simultaneously carry out the decomposition and sterilization of medical waste through supercritical water oxidation. In addition, it can be expected that infection during separation processes will be kept ot a minimum, as it will be necessary to separate the various constituents of syringes, evacuated blood collection tubes and other medical waste. To date, it has been demonstrated that, within 20 minutes under supercritical conditions of 450ºC and 25 MPa, it is possible to achieve complete oxidative decomposition of polypropylene, and also detoxification, including the sterilization of Escherichia coli (E. coli).3 However, for the envisaged application in places where the actual waste generation takes place, it will be essential to design a compact system that is capable of carrying out the treatment.

This research focused on disposable syringes and evacuated blood collection tubes as typical infectious medical waste, and experimental investigations were undertaken to construct a treatment process capable of treating the waste in its entire form, without removal of needles and metal parts, aimed at production of a compact treatment unit for the model medical waste.

2. Experimental decomposition of medical waste using a batch reactor
(1) Method
To ascertain whether medical waste can be decomposed through supercritical water oxidation, experiments were conducted on treating syringes with needles attached and evacuated blood collection tubes. The medical devices used were all-plastic polypropylene syringes (Henke Sass Wolf, NORM-JECT 2 mL) with SUS304 hypodermic needles (Terumo, Terumo hypodermic needle 20G X 1½"), and evacuated blood collection tubes (Terumo, Venoject II) containing a blood serum separation media (0.109 mo1/L buffered sodium citrate).

A syringe with a needle attached (total weight 1.5 g), and a blood collection tube (total weight 8.6 g), were each enclosed in an Inconel 625 batch reactor (internal volume 690 mL) with a hydrogen peroxide solution 75.4 mL as the oxidizing agent. After heating from room temperature to 450ºC in approximately 30 minutes using a high frequency induction heater (Suzuki Shoko), supercritical conditions of 450ºC and 25 MPa were maintained for 30 minutes. Open cooling to room temperature after completion of the reaction took approximately 6 hours.

Additionally, to examine the effect on the chloride content of blood, a syringe decomposition experiment was conducted using an isotonic sodium chloride solution (0.9% sodium chloride solution) as a blood model. A single syringe 1.0 g and hypodermic needle 3 cm were enclosed in a SUS316 batch reactor (internal volume 10 mL) with a diluted isotonic sodium chloride solution. The reactor was immersed in a sand bath and heating was carried out at 450ºC and 25 MPa for 5 to 30 minutes. After completion, the reaction was terminated immediately by immersion in a coolant.

In each of the experiments, after the reactions, the total organic carbon content in the residual liquid was measured in a TOC analyzer (Shimadzu, TOC-5000A) and the remaining TOC concentration and TOC conversion ratio were analyzed as indicators of decomposition.

(2) Results and discussion
Fig. 1 shows the state of the reactor contents before and after the reactions when a syringe with a needle attached and a blood collection tube were treated using supercritical water oxidation. After decomposition of the syringe, apart from the needle, only liquid contents were recovered with no solid residue remaining. The TOC conversion ratio was greater than 99.8%, suggesting that a single syringe with a needle attached can be almost completely decomposed through supercritical water oxidation. On the other hand, in the case of the blood collection tube, the remaining TOC concentration of 453 mg/L was a little high, and there was a residue of approximately 12 mg from the metallic sealing cap and the inorganic solids derived from the chemicals. In the treatment of blood collection tubes by decomposition, it may be possible to dispose of the tubes in their entire form in the same way as syringes if consideration is given to separation and removal of solid residue through the addition of a sufficient amount of oxidizing agent.

E26

Development of a New On-site Treatment System for Infectious Medical Waste Using the Supercritical Water Oxidation Method

66760 Ryo Tachino (Graduate Advisor: Professor Yoshito Oshima)

Department of Environment Systems, March 2008 Completion

Key words: Supercritical water oxidation, Medical waste, Continuous flow reactor, 2-stage treatment process

1. Introduction

In recent years, a variety of medical waste products have been produced due to advancements in and diversification of medical technology. The economic burden of separating, storing and treating such waste is increasing for many medical institutions. Syringes, catheters and disposable plastic implements such as administration sets comprise approximately 40% of all medical waste. Moreover, the appropriate treatment of infectious medical waste contaminated with blood and body fluids, as well as sharp hazardous waste, including injection needles, surgical knives and broken glass is also necessary. Although the treatment of medical waste is conducted through outsourcing at over 95% of medical institutions, it is not uncommon for risk communication between the waste producer and the treatment company to be inadequate. This lack of proper communication, in turn, leads to the risks of improper treatment and illegal dumping carried out by fraudulent companies, as well as infections both inside and outside of hospitals due to needlestick injuries and other damages incurred during the storage and transportation of medical waste. In order to minimize such risks, it is desirable that the producer of medical waste take responsibility to promptly conduct the decomposition process at the waste's place of origin (on-site).

This research proposes a new on-site decomposition treatment system utilizing supercritical water oxidation to serve as an interim treatment method for infectious medical waste as an alternative to incineration disposal administered through outsourcing. With this treatment system, the decomposition of medical waste and sterilization of infectious substances can be performed concurrently through supercritical water oxidation, allowing for a substantial reduction in the amount of infectious medical waste. Furthermore, by using this system, it becomes unnecessary to separate medical waste that consists of numerous materials, such as syringes and vacuum blood collection tubes. Thus, this system can be expected to minimize infections contracted during the waste separation process. As of present, complete oxidative decomposition of polypropylene under supercritical conditions at 450 °C and 25 MPa with a reaction time of 20 minutes has been successfully conducted, and the removal of toxins including the sterilization of E. coli bacteria also has been shown to be possible using this system. These results notwithstanding, when considering the actual implementation of such a system at the waste producer's location, it is essential to design a compact treatment system with sufficient processing capacity.

The purpose of this study is to construct a compact size treatment system that processes sample waste matter. This objective is pursued by conducting experiments to formulate a treatment process that can handle infectious medical waste products in their entirety, without removing needles or metal parts. The tests focus on disposable syringes and vacuum blood collection tubes, which are typical examples of infectious medical waste.

2. Experiments on Decomposition of Medical Waste Using a Batch Reactor

(1) Testing Method

In order to ascertain the potential of decomposing medical waste through the supercritical water oxidation method, experiments employing a batch reactor were conducted to treat vacuum blood collection tubes and syringes with intact needles. The following medical instruments were used in these experiments: a polyurethane all-plastic syringe (NORM-JECT 2 mL, produced by Henke Sass Wolf), a syringe made of SUS304 type steel (produced by Terumo, with 20G×1½" needles), and a vacuum blood collection tube (Venoject II, produced by Terumo) containing serum separating medium (a buffer solution with 0.109 mol/L of sodium citrate).

A 75.4 mL solution of hydrogen peroxide was added as an oxidizing agent to the syringe with a needle (total weight: 1.5 g) and blood collection tube (total weight: 8.6 g), respectively. Both the solution and the medical instrument in particular were placed into a batch reactor made from Inconel 625 (internal volume: 690 mL). Next, a high frequency induction furnace (made by Suzuki Shoko) was used to elevate the temperature of the reactor from room temperature to 450 °C over a span of approximately 30 minutes. Afterwards, supercritical conditions were sustained for 20 minutes at 450 °C and 25 MPa. Once the reaction time ended, the reactor was allowed to cool down to room temperature for roughly 6 hours.

Also, in order to observe the effect on chlorine content in blood, a syringe decomposition experiment was conducted using physiological saline (0.9% sodium chloride solution) as a substitute for blood. A 0.1 g portion of a syringe and a 3 cm needle were placed into a batch reactor made from SUS316 type steel (internal volume: 690 mL) along with diluted physiological saline. This reactor was then placed in a sand bath and subjected to heating at 450 °C and 25 MPa for 5 to 30 minutes. Afterwards, the reactor was immediately immersed in coolant to terminate the reaction.

In both of these experiments, the remaining total organic carbon density in the liquid was measured with a total organic carbon (TOC) analyzer (the TOC-5000A, made by Shimadzu). The remaining TOC density and TOC conversion were used as indicators of decomposition.

(2) Results and Discussion

The contents of the reactor as they appeared before and after the reaction induced when treating the syringe with a needle and the blood collection tube using the supercritical water oxidation method are shown in Fig. 1. Following the decomposition of the syringe, no solid residual matter apart from the needle was present, and only liquid components were recovered. The TOC conversion of this remaining fluid exceeded 99.8%, suggesting that a syringe with a needle attached can be decomposed almost entirely when treated using the supercritical water oxidation method. Meanwhile, in the experiment with the blood collection tube, the remaining TOC density displayed the slightly high value of 453 mg/L, and the metal film cap of the tube and approximately 12 mg of inorganic solid matter from medicine remained in the reactor. Noting that the addition of a sufficient amount of an oxidizing agent would facilitate the separation and removal of such solid residual matter, complete decomposition treatment of blood collection tubes, just as with syringes, is thought to be possible.

Fig. 1 Decomposition Experiment with a Syringe (a) and Blood Collection Tube (b) Using a Batch Reactor

E29

March 2008

Development of New Onsite Infectious Medical Waste Treatment System using Supercritical Oxidation Method

66760 Ryo Tachino (Advisor: Yoshito Oshima)
Department of Environment Systems Final Dissertation

1. Introduction

With the recent advancement and diversification of medical technology, the wide variety of medical waste now being emitted has increased the economic burden of its separation, storage, and treatment at numerous medical organizations. As nearly 40% of this waste consists of syringes, catheters, and plastic disposable tools like infusion sets[1], there is a need for the simultaneous proper disposal of blood or bodily fluid soaked infectious waste alongside sharps waste such as needles, scalpels, and broken glass. As most treatment is done via outsourcing for over 95% of medical organizations[2], quite often there is a lack of divulging the risks involved to these disposal companies. This problem is directly connected to needlestick injuries and other infections during storage and transit, as well as the risk of improper disposal and unlawful dumping by malicious companies. In order to minimize this risk, the waste emitter should take the initiative at the waste emission location (onsite) and promptly conduct detoxification treatment at its point of origin.

This study proposes a new interim onsite detoxification treatment system that uses supercritical water oxidation (SCWO) method as an alternative to the incineration method used by outsourcers. This system will be able to achieve significant volume reduction of infectious medical waste as both breakdown and sterilization can occur simultaneously through SCWO. We can also expect a reduction of infections as work to separate various materials such as syringes and blood collection tubes becomes unnecessary. Although polypropylene has shown both complete oxidative degradation and the ability to detoxify and sterilize Escherichia coli (E. coli) after a 20 minute reaction at 450℃ and 25 MPa[3], the design of a compact treatment system is indispensable when envisioning its application at actual waste emission locations.

This study's objective is to create a small-sized treatment system model to conduct infectious waste treatment. We focused on disposable syringes and blood collection tubes, typical infections waste, and conducted experiments directed at formulating a process capable of completely treating this waste without the removal of needles and metal parts.

1. Decomposition of Medical Waste by Batch Reactor Experiment

(1) Methods and Materials

In order to confirm the feasibility of decomposition of medical waste via supercritical water oxidation, tests were run on needle-tipped syringes and blood collection tubes using a batch reactor. The medical equipment used were both all plastic polypropylene NORM-JECT 2mL (Henke Sass Wolf) and SUS304 steel 20Gx1 1/2in (Terumo) syringes as well as Venglect II blood collection tubes (Terumo) containing buffer solution consisting of 0.109 mol/L sodium citrate for serum separation. Both needle-tipped syringes (1.5g) and blood collection tubes (8.6g) were enclosed into an Inconel 625 alloy batch reactor (690mL vol.) containing 75.4mL of hydrogen peroxide solution for an oxidizer. A high frequency induction furnace (Suzuki Shoko Co. LTD) was used to heat the reactor to 450℃ in 30 minutes, and we maintained supercritical water oxidation at 450℃・25 MPa for 20 minutes. After completion of the reactions, around 6 hours was required to cool down to room temperature.

Furthermore, in order to research the effects of chlorine content in the blood, decomposition tests were conducted on syringes containing a saline solution (0.9% sodium chloride solution). A 0.1g syringe w/ 3cm needle and diluted saline were enclosed in an SUS316 steel batch reactor (10 mL vol.). The batch reactor was immersed in a sand bath, and heating was performed at intervals of 5 to 30 minutes. The reaction was stopped by directly immersing the reactor in water after tests were completed.

In both instances, the total organic carbon (TOC) concentration of the residual fluid was measured after each reaction with a Shimadzu TOC Analyzer (TOC-5000A) and the residual TOC concentration and TOC conversation rate were used as indices for the data.

(2) Results and Observations

The conditions of a needle-tipped syringe and blood collection tube inside the reactor before and after the SCWO reaction are displayed in Fig. 1. Except for the needle, no solid residue remained after decomposition, and only the liquid component was collected. The TOC conversation rate was recorded at over 99.8%, thus implying that nearly complete disposal treatment of one needle-tipped syringe is possible.

The blood collection tube showed a somewhat high level of residual TOC concentration of 453 mg/L, leaving behind 12mg of the metal film seal and some pharmaceutical-based inorganic solid matter. By adding a sufficient amount of oxidizer in the disposal treatment of the blood collection tube, it appears that, similar to the syringe, complete decomposition of the tube is possible by also taking note of its breakdown and elimination of solid residue.

Commentaries from the Judges

James Davis Malcolm James Ken Wagner

James Davis

General Comments:

The two primary goals for any translator are to convey the content of a document accurately and to express that content using the appropriate style, register and tone. This particular document was technical in nature, and the translation was to be published in a scholarly journal for an audience of professionals. No translator can be an expert in all fields, but some background knowledge—an understanding of the problem to be solved, familiarity with the type of equipment and materials to be used, and an understanding of the significance of the experiments themselves—is necessary in order for the translator to grasp the meaning that (s)he must convey. At the same time the translator must know what form—what terminology and what type of sentence structure—the reader of the translation is expecting to encounter, so the translator can meet those expectations. Relatively quick searches of print and electronic resources can provide enough information to meet the translator's needs. If the goals mentioned above are achieved, the translation will be successful.

The text to be translated in this instance was only a portion of a longer document, which included several figures. Even though the remaining text and the legends for the figures were not to be translated, careful reading of the remaining text and close examination of the figures could help the translator gain a better understanding of the content and could help the translator answer questions that might arise regarding the portion of the text that was to be translated. Such questions might include the following: Was one syringe treated at a time, or were multiple syringes processed in a single reaction? Were syringes and blood collection tubes treated together, or were they processed separately? In fact, careful reading of the text and close examination of the figures would conclusively answer such questions.

All five of the finalists produced good translations. When judging the individual translations I considered overall readability and fifteen specific features—words, phrases, the rendering of numbers, etc.—that seemed to be particularly important for this document. I then ranked the five finalists according to a score for general readability and a score for the specific features. Comments for each of the finalists follow.

E5

The translator generally demonstrated a good understanding of the content of the source document, but there were problems with the accuracy of some specific statements, and there were some problems with word choice. In the first paragraph of the introduction the authors described the need to 同時に適正処理する the various types of waste mentioned previously in the same sentence. The authors' use of 同時に indicates the need to process different types of waste at the same time. However, this important information does not appear in this paragraph. In the same paragraph the term 悪質業者 was rendered as "unethical agencies." In certain fields, such as translation, companies are known as "agencies," but in the field of waste disposal or waste management a better translation would be "unscrupulous companies," "unscrupulous contractors" or even "unscrupulous haulers." In the second paragraph of the introduction the authors referred to the 毒素の無害化を含めた大腸菌の滅菌. The translation reads "detoxification and sterilization of E. coli bacteria." Generally speaking, an item (such as a glass bottle or a metal utensil) may be sterilized, but bacteria are not sterilized. However, bacteria may be eliminated through the process of sterilization. Why did the authors include the verb 含めた? They probably considered the destruction of toxic materials produced by the bacteria to be an extension of the elimination of the bacteria itself. Based on this understanding of the content the translation could read “complete elimination of E. coli, including the destruction of toxins produced by the bacteria.”

E16

This translation generally captured the intended meaning of the source text, but there were a number of inaccuracies and oversights. In the first paragraph of the introduction the authors describe the need to 同時に適正処理する the various types of waste mentioned previously in the same sentence. The authors’ use of 同時に indicates the need to process different types of waste at the same time. However, this important information does not appear in this paragraph. In the same paragraph the authors mention 院内外感染, which was translated as “hospital-related infections.” In fact, the use of 内外 suggests a wider occurrence of such problems; the translation could read “infections inside and outside of medical facilities.” In the second paragraph of the introduction the authors referred to the 毒素の無害化を含めた大腸菌の滅菌. The translation reads “sterilization of Escherichia coli, including detoxification.” Generally speaking, an item (such as a glass bottle or a metal utensil) may be sterilized, but bacteria are not sterilized. However, bacteria may be eliminated through the process of sterilization. Why did the authors include the verb 含めた? They probably considered the destruction of toxic materials produced by the bacteria to be an extension of the elimination of the bacteria itself. Based on this understanding of the content the translation could read “complete elimination of E. coli, including the destruction of toxins produced by the bacteria.” In the first sentence of the methods section the translation reads “an experiment was conducted in which syringes with needles attached and a vacuum blood collection tube were processed.” It is not clear why the translator chose to use singular for the experiment, plural for the syringes, and singular for the blood collection tube. However, Fig. 1 indicates that there were two types of experiments and that only one item was processed in each experiment. In the next sentence the translation refers to “a SUS304 syringe,” but the authors described an SUS304 製の注射針. The translator’s uncertainty regarding the actual conduct of the experiments led to repeated problems with singular vs. plural throughout the methods section. On the other hand, the translator’s use of terms such as “physiological saline” and “blood analog” indicates a good understanding of the materials and concepts involved in this field.

E20

This translation was very well written; the use of “novel” for 新規 was one of several excellent word choices. However, there were some misstatements and misunderstandings. In the second paragraph of the introduction the authors referred to the 毒素の無害化を含めた大腸菌の滅菌. The translation reads “detoxification, including the sterilization of Escherichia coli (E. coli).” Generally speaking, an item (such as a glass bottle or a metal utensil) may be sterilized, but bacteria are not sterilized. However, bacteria may be eliminated through the process of sterilization. Also, the clause 毒素の無害化を含めた modifies 滅菌, not the other way around. Why did the authors include the verb 含めた? They probably considered the destruction of toxic materials produced by the bacteria to be an extension of the elimination of the bacteria itself. Based on this understanding of the content the translation could read “complete elimination of E. coli, including the destruction of toxins produced by the bacteria.” In the third paragraph of the methods section the authors referred to the 血液中に含まれる塩素分による影響. The translation reads “the effect on the chloride content of blood.” The authors’ use of による indicates that 塩素分 is the agent—not the recipient—of whatever effect may exist. The recipient of this effect was not stated explicitly, but the experiments described in this paper are decomposition experiments, so the translation could read “the effect of the chloride content of blood on decomposition.” In the same paragraph the translation mentions “A single syringe 1.0 g,” but the source text describes “注射器片 0.1 g.” The first problem is the weight, which should be "0.1 g." The second problem is the handling of 片. Perhaps because of the error regarding the weight, the translator may have thought that an entire syringe had been used. In fact, the authors' use of 片 suggests that nothing more than a "fragment" of a syringe was used in this experiment. (This would be reasonable in light of the weights involved in the different experiments.) A more accurate translation would be "A 0.1 g fragment of a syringe."

E26

This translation followed the general thread of the information provided in the source text. However, there were omissions, problems with terminology, and problems with sentence structure—all of which interfered with the expression of that information. For example, the term メス (which appears in the first paragraph of the introduction) is typically known as a "scalpel." In the same paragraph the authors described the need to 同時に適正処理する the various types of waste mentioned previously in the same sentence. The authors' use of 同時に indicates the need to process different types of waste at the same time. However, this important information does not appear in this paragraph. The term 悪質業者 does not mean that such companies are "fraudulent." Rather, the actions listed by the authors indicate that these companies are "unscrupulous." In the second paragraph the authors proposed this treatment system as a 中間処理方法, which was rendered as "interim treatment method." The word "interim" suggests that the proposed method will eventually be replaced by some other method. In fact, the authors considered this system to be an "intermediate treatment method." Thus, additional treatment steps may occur upstream or downstream of the proposed system. In the same paragraph the authors referred to the 毒素の無害化を含めた大腸菌の滅菌. The translation reads "removal of toxins including the sterilization of E. coli bacteria." Generally speaking, an item (such as a glass bottle or a metal utensil) may be sterilized, but bacteria are not sterilized. However, bacteria may be eliminated through the process of sterilization. Also, the clause 毒素の無害化を含めた modifies 滅菌, not the other way around. Why did the authors include the verb 含めた? They probably considered the destruction of toxic materials produced by the bacteria to be an extension of the elimination of the bacteria itself. Based on this understanding of the content the translation could read "complete elimination of E. coli, including the destruction of toxins produced by the bacteria." In the first paragraph of the methods section the translation refers to "a syringe made of SUS304 type steel," but the authors described an SUS304 製の注射針. In the following paragraph the translation states that "the reactor was allowed to cool down to room temperature for roughly 6 hours." It is not clear to the reader whether the six-hour period represents the time required for cooling or whether the reactor sat idle for six hours after the temperature had reached room temperature. However, the authors indicated that 室温まで放冷するのに約６時間を要した. Thus, it would be more accurate to say that "a period of roughly six hours was required for the reactor to cool down to room temperature."

E29

This translation captured much of the intended meaning. However, problems with sentence structure and word choice limited the potential value of the information contained within the document. Some misunderstandings compounded the possible confusion on the part of the reader. In the first sentence the translation refers to "the wide variety of medical waste now being emitted." In the context of environmental pollution or waste management the verb "emitted" is typically used for gases, not for solid waste. Even though the authors used 排出される, "produced" or "generated" would be a better choice for the verb in this context. In the following sentence the translation refers to "syringes, catheters, and plastic disposable tools like infusion sets." The translator thought that three separate categories of items were listed. In fact, the authors mentioned only one category (プラスチック製ディスポーザブル器具), but the authors provided three different examples (注射器, カテ ーテル and 輸液セット) of items that fall into this category. In some instances the word 器具 can refer to "tools," but in this context "items" would be a better choice. Based on this understanding of the structure of this portion of the sentence, a more accurate translation would be “disposable plastic items—such as syringes, catheters and infusion sets.” In the same paragraph the translation includes a reference to “infections” but does not mention that these are 院内外感染. The use of 内外 suggests a wide occurrence of such problems; the translation could read “infections inside and outside of medical facilities.” In the second paragraph the translator chose the word “interim” to describe the 中間処理方法. The word “interim” suggests that the proposed method will eventually be replaced by some other method. In fact, the authors considered this system to be an “intermediate” treatment system. Thus, additional treatment steps may occur upstream or downstream of the proposed system. In the same paragraph the translation states that “polypropylene has shown both complete oxidative degradation and the ability to detoxify and sterilize Escherichia coli (E. coli).” The authors actually stated that ポリプロピレンが完全に酸化分解することや、 毒素の無害化を含めた大腸菌の滅菌が可能であることが示された. In this phrase the basic structure is simply “... ことや、... ことが示された. Consequently, the subject ポリプロピレン goes with the intransitive verb 酸化分解する, and subject 滅菌 goes with 可能である. Based on this understanding of structure, the translation could read “it has been shown that polypropylene undergoes complete oxidative decomposition and that complete elimination of E. coli, including the destruction of toxins produced by the bacteria, is possible.”

Malcolm James

The stated purpose of the contest is "to cultivate new talent in commercial non-literary translation." In judging, I was trying to find the person with the most talent to become a top commercial translator, not the person who produced the best translation at this stage. Simple misinterpretations are likely to disappear with experience, so I regard them as less of a problem than if this were an actual commercial translation. I’m much less willing, however, to be lenient on translators who submit a translation that doesn’t seem to have got a final read-through, or who produce a translation that doesn’t seem to have considered the document’s context and purpose. Each of the entries commented on below has its own merits and displays the signs of a competent translator. All the finalists have the potential to be good commercial translators and are to be congratulated on their efforts.

General points

This year's passage differed from earlier years in that it was more academic. To produce a good translation, the candidates needed to read the original very carefully and to think in depth about the process being described and the overall context. Simply reading the section to be translated and disregarding the rest of the paper would probably have resulted in misunderstandings. This was a difficult task, but it presented a good opportunity for entrants to demonstrate their comprehension abilities as well as their skills at translating with both accuracy and readability.

Specific points for #E5

The translation gave the impression that the translator had put a lot of effort into reviewing, checking, and polishing. There were a couple of places where he or she seemed to have misunderstood the process, such as missing the significance of dilution for the saline, and not realizing that separating/sorting waste included taking the needles off the syringes, etc. Good parts include the addition of "in separate experiments" in a couple of places to make the logic work in English. To improve, the translator probably needs to step back and think a little more about parts that don't seem to make sense.

Specific points for #E16

This translation gave a generally good impression, but seemed to lack an understanding of the process being described and the overall context in which this paper was written. For example, in the opening paragraph it missed the "concurrently" that is one of the selling points of the novel system. Also, the translator's note reveals that the translator missed the significance of the references, and seems to be interpreting this part of the passage as a general statement by the author. Although the references didn't need translating, the author was referring to a specific study (reference 3), which appears to be research demonstrating that E. Coli could be eliminated. The translation also had several good parts, such as the paragraph describing investigating "the influence of the chlorine content." Improvement would come through taking a step back from the text and thinking more about context.

Specific points for #E20

This translation reads well, and had many places where it was the best of the finalists. I particularly liked "it is desirable for generators of medical waste to take responsibility for ..." However, there were a number of logical errors, including "In recent years ... waste is now being generated" in the first paragraph. In fact, the translation seemed to improve as it went along, so I recommend allocating more time to going back and reviewing the early parts after finishing the translation.

Specific points for #E26

This translation reads well, and had several places where it was the best of the finalists. I particularly liked the end of the first section because of the way the translator brought the purpose of the study to the front of the paragraph to make it easier to read. However, there were a number of careless errors, such as describing one of the syringes as being made of steel, and a copy-paste error that changed the size of the reactor. Improvement would come from more careful checking and reading before delivery.

Specific points for #E29

This translation generally gave a good impression, but would have benefited from allocating more time to reading through the final version. That would have caught problems with spelling ("infections waste"), grammar ("The medical equipment used were both ..."), and incorrect logic ("As most treatment is done via outsourcing, ... there is a lack of divulging the risks involved ..."). On the other hand, there were several good points, such as "a need for the simultaneous ... disposal of ..." in the first paragraph.

Ken Wagner

This year's contest passage is about a very powerful experimental treatment system for sharp and infectious medical waste. The passage presents two different challenges. The first part is an almost dramatically written introduction using standard natural Japanese that must be translated into smooth natural English. The second part is a highly technical section written in more mechanical, technical Japanese and seems easily decipherable, but is filled with troublesome details that could derail a translation.

In this year's contest, all five of the finalists put considerable thought into their translations, demonstrating the potential for improvement with further exposure to Japanese- and English-language technical literature.

Ranking the finalists was difficult, because the translations of the first- and second-place finalists were almost equally good, as were the translations of the third- and fourth-place finishers. Judging was further complicated by the fact that contestants making a larger number of errors in certain places sometimes had the most eloquent translations in other places. However, after all things were considered, first place went to the most accurate translation, E5, which was almost pristine in its lack of misunderstandings. E20 almost tied E5 for first. E16 and E26 were not far behind, and E29 had obviously put a lot of thought and effort into his or her translation.

There were some common threads in the translations, including common problem words in Japanese. In 悪質業者, the contestants came up with many natural English words for 悪質 (unethical, unscrupulous), but many had trouble with the problem word 業者 (e.g., the unnatural "operators" instead of "vendors" or "companies") for which dictionary definitions can be misleading. The 器具 of 医療器具 also seemed like a challenge. The sundry disposable items treated in the study, while technically medical devices, are more like supplies. Medical equipment, devices, or instruments evoke the image of stethoscopes and MRI machines. Here, 器具 could sometimes have been translated as "items" (usually detestable, I know) or "articles."

Another common thread is the way the phrase about E. coli. and sterilization was handled. It seemed that almost no one did the reading necessary to translate the phrase 毒素の無害化を含めた大腸菌の滅菌. First, there's the notion of 滅菌, sterilization. In English, to sterilize means to "make (something) free from bacteria or other living microorganisms." Since germs aren't being washed off of the E. coli, "sterilization" is probably not the right word to use here. Eijiro on the Web offers a gloss of "destroy bacteria" for 滅菌. So, one could say that the treatment process "destroys" E. coli. Next, there's the nature of E. coli. The Wikipedia article on pathogenic E. coli says that "certain strains of E. coli, such as O157:H7 …, produce potentially lethal toxins." Thus, the Japanese phrase is discussing treatment of the organisms themselves (E. coli) and the toxins that they produce: two separate things about E. coli (like yeast and the alcohol it produces). In English you might want to say the process can "destroy E. coli and even neutralize its toxins." However, the translations offered went from completely backwards as though the microorganism was a toxin:

> *"detoxification, including the sterilization of Escherichia coli (E. coli)"
> *"the removal of toxins including the sterilization of E. coli bacteria"
> to basically grammatically correct, but mistranslating sterilization:
> *"detoxification and sterilization of E.coli bacteria"
> to bowing to the grammar of the phrase and then repudiating the translation in a footnote:
> *"sterilization of Escherichia coli, including detoxification1"
> 1I believe it is possible that the words relating to detoxification and sterilization of Escherichia coli are in the wrong order in the source text. If they were to be reversed, this section would read: "and that detoxification of toxins, including sterilization of Escherichia coli, is possible…"

There are three lessons to learn from this. 1) Virtually every new subtopic in a technical translation can potentially require some extra reading in the target language. 2) It pays to use the dictionary as a thesaurus for even the simplest words. 3) As I have found repeatedly, one's most brilliant deductions about what the text means (as opposed to what it says) are often wrong. There's almost a proportional relationship: the more brilliant the deduction, the more likely wrong.

It could be that the subject of the contest passage was entirely outside the contestants' field of specialization, making this a little disorienting. However, this is an example of a translation problem that can be tracked down step-by-step simply through Wikipedia and a free online dictionary without a lot of background knowledge on the part of the translator.

Nonetheless, all JAT translation contestants deserve a measure of respect. The contestants all make a considerable effort to produce their translations, even though there is a very low probability of receiving any feedback and an even lower probability of any kind of recompense (i.e., winning). I would just like to say that I recognize the effort involved.
Individual commentaries appear below.

First Place Finalist E5

E5 was awarded first place because of the high overall accuracy of the translation and the absence any major isolated misunderstandings. E5 avoided the pitfalls that many other finalists succumbed to. The English also sounded native, if not the exact polished jargon of a professional technical writer. Because the problems of jargon and register will resolve themselves as E5 reads more technical literature in Japanese and English, E5 was considered to show the greatest potential for growth.

Strengths: An outstanding feature of E5's translation was the understanding of the experimental method, knowing and conveying to the reader how many repetitions were performed, different test pieces were used, or different reactor runs were used. With some of the other translations, it was not clear which pieces went into the reactors together or whether multiple treatments were performed.

Taking a bit of license, E5 added the phrase "in separate experiments" to show that a syringe (with needle) and a blood collection tube were placed in the reactor separately and treated at different times. E5 also mentioned that plural experiments were performed on the effects of chlorine. To specify that multiple reactions with multiple heating times were used in this experiment, E5 used the phrase "for periods of between 5 and 30 minutes (in separate experiments)." (Maybe a little overkill there.) E5 also said that the figure shows "a" (not "the") treated syringe and tube, conveying to the reader that several items had been treated. Although the intended expert audience would realize (and the tables in the text show) that several treatments were performed, it is easier on the English-language reader to write to expected conventions, using pluralization and specifically describing the steps carried out.

Other high points of E5's translation were: using "soiled (with blood…)" for 付着, "unethical (companies)" for 悪質(業者); using "supercritical water oxidation" rather than "the supercritical water oxidation method;" understanding that 素材 was the items in the waste (syringes, etc.), not the ingredients of the materials; using the phrase "brought to a temperature;" putting "Figure 1 shows" at the beginning of the sentence describing the figure to craft an English sentence that wasn't meandering; understanding that the "12 mg" consisted of both the solids from the chemicals/drugs and the metal film; adding translator's notes to explain that not all of the key words listed for the article appeared in the translated excerpt; and translating "…構築" as "development of a model."

Some Things to Consider: An improper verb conjugation in the first sentence was extremely off-putting and distracted from the high level of accuracy when judging the translation. "In recent years, …waste is being produced." Recent years happened before now, so it must be "waste has been produced." 同時に, a crucial element, was omitted from the sentence saying that contaminated and sharp waste must be treated simultaneously. 処理 was translated as “disposal,” when “treatment” (or omitting it - just “decomposition” is usually better than “decomposition treatment”). To avoid wordiness 医療機関 was simply translated as “facilities” when “medical facilities” might sound better to the English reader’s ear. 丸ごと was omitted from 丸ごと処理できる in the last paragraph of the introduction. The idea was that the author wanted to treat those pieces of waste whole. “As a way of checking” is the wrong register. Products were identified by manufacturer first and model name second when the conventional English-language order is the opposite: product, manufacturer (Venoject II, Terumo).

Second Place Finalist E20

E20’s translation was very pleasant to read, and some discussion was required to select a first place finisher between E5 and E20. However, E20’s translation was slightly less accurate that E5’s. The fact that different items were treated separately at different times and for different lengths of time was not spelled out as clearly as in E5’s translation. However, E20’s translation contained some terminology and usage that showed that E20 had read (or is in the habit of reading or is familiar with) English-language technical literature. Many English sentences were well crafted and long Japanese sentences were divided in a pleasing manner. However, some word usage was arbitrary or unnatural which may just be a matter of learning which glosses to pick from a dictionary or doing more reading to pick up the conventions of English-language technical writing. Still, E20’s translation was accurate, pleasant to read, and displayed technical knowledge or the willingness to do research, and it is just a matter of practice in order for E20’s to realize his or her potential for growth.

Strengths: E20 scored a hit with the judges in very first line by using the word “novel” for 新規. That is the conventional term used in patents and technical literature for something that is, according to the dictionary definition, “1) new and not resembling something formerly known or used or 2) original or striking especially in conception or style.” E20 was the only finalist to use the term. E20 was also the only finalist to call the blood collection tubes “evacuated,” a more official term than “vacuum.” Other attractive features of E20’s translation included: translating “[clause]が, …適正処理が求められている” as “which has given rise to a need for…[treatment]” rather that translating が as “but;” using “contaminated with” for 付着; “unscrupulous [vendors]” for 悪質業者; “this leads to” for つながるという問題がある; creating a dynamic English-language feel with “it will be essential to design;” realizing that 丸ごと meant “whole,” not “completely” (although said “in their entire form”); and using “metallic sealing cap,” which loses the Japanese word for film but looks like the drawing of a Venoject II on the web.

Some Things to Consider: In addition to some things mentioned about E5’s translation, E20 translated the 素材 phrase as “various constituents of syringes, evacuated blood collection tubes and other medical waste” which obscures the fact that the syringes, etc. are the constituents instead of the materials comprising the syringes, etc. In E5’s translation the waste to be treated was clear a tossed salad of syringes, tubes, etc. Other considerations include: the important omission of “batch reactors” in the first sentence of the Methods section; using the Japanese-style order of product and manufacturer citation; typo of mo1/L, considering the distance of the “l” key is from the “1” key and the importance of mole per liter concentrations (of course, E20 might not do chemical translation); saying “the effect on the chloride content of blood” (backwards); and translating 片 as a single syringe when it’s a piece of syringe.

Finalist E16

E16 was selected as the third place finalist, based on a combination accuracy and target language writing. The translation was accurate overall and contained many pleasant turns of phrase that were in some cases even nicer that those of E5 or E20. However, there seemed be a little more awkward or literal usage and a few more mistakes than in E5 and E20's translations.

Strengths: In addition to things mentioned regarding the above translations, there were many good turns of phrase: a beautiful opening sentence that included the phrase "shouldering an increasing economic burden." E16 also used "contaminated" for 付着; "sharps;" "underhanded" (probably the wrong register, but very evocative) for 悪質; "disposal company" (vs. agency, operator) for 業者; "to undertake an experimental investigation into;" "batch reactor" rather than "batch-type reactor" (5:1 preference on Google); and blood analog ("model" may be better here, but still pretty good).

Some Things to Consider: E16 translated 院内外 as "hospital-related infections," which might be true, but the author seems to be emphasizing that off-site sterilization leads to infections in two different sets of workers (those inside and outside of the hospital). Handling of the E. coli phrase is described above. Other things noted included: dropping the crucial term 丸ごと from the last paragraph of the introduction; calling the SUS304 needle a syringe and referring to multiple syringes (with multiple needles) in the reactor thereafter; and using "were set as (decomposition indices)" for とした instead of "were used as" or "were selected as;" and not including the metal film in the 12 mg residue.

Finalist E26

As mentioned above, there were two sets of near ties in this year's contest (ties for first and ties for third), and it was very hard to rank one translation above the other at these two spots. E26's translation was very pleasant to read and was one of the best to read independent of the Japanese text. However, there were a few obvious mistakes.

Strengths: E26 by far produced the best translation of the paragraph describing the objective of the study. The main point of the paragraph is the study's objective and E26 put the objective at the beginning of the paragraph "The purpose of this study is to construct." How the objective is accomplished is supporting information that can come later. If translated in the Japanese order of the clauses, such sentences are rambling and bury the lead. In addition to things done by the other contestants, other strengths of the translation were: using the connector "in turn" to add a pleasant flow in "this lack of proper communication, in turn, leads to…;" using authentic English-language terms such as "waste producer" and "treatment company;" using "ascertain" for 確認; making the meaning of 素材 clear (the whole items, i.e., syringes, etc.); translating 丸ごと as "in their entirety" (although "whole" might be better)" since several finalists translated 丸ごと as "completely" or omitted it for some reason; translating 大幅な減容 as a "substantial reduction;" and using "formulate a treatment process," a great translation of 構築. The translation instructions for the contest were slightly ambiguous about translating the caption, and E26 provided a translation of the caption.

Some Things to Consider: There seemed to be a few missing or misused articles here and there, and a few words such as "detoxification" and "decomposition" were mixed up. E26 omitted "simultaneous," a key element of the process in "appropriate treatment of infectious medical waste … as well as sharp … waste." "Infections … due to needlestick injuries and other damages" should be something like "due to neeldesticks and other accidents" There was some awkward (and literal) usage such as "incineration disposal administered through outsourcing." Like E16, E26 mistakenly called the SUS304 needle a syringe. E26 made an effort to show that the syringe and tube reactors runs were separate by using the term "in particular," but the reader may not have understood that. ("Both the solution and the medical instrument in particular were placed into a batch reactor….") Unfortunately, E26 also thought the process affected the chlorine content of the blood rather than the chlorine content of the blood affecting the process. E26 said that "noting that the addition of a sufficient amount of an oxidizing agent would facilitate the separation and removal of such solid residual matter." However, this sentence appears to mean that you have to make arrangements to remove the residual solids (…留意) and to add enough oxidizing agent (…上).

Finalist E29

This year's contest passage contains a lot of detail, the need to acquire some knowledge of the treatment process involved, and a sizable portion of less mechanical, non-technical writing. As a result, it cannot be translated at a glance by an inexperienced translator or non-translator. Although E29 did not reach the levels of source-language comprehension and target-language usage of the other four finalists, one must appreciate the amount of thought that went into deciphering and interpreting text (or the skill that E29 has already acquired if this was a slap-dash job). E29 will certainly continue to grow as a translator with this type of effort.

Strengths: E29 was only finalist to translate 伴って as "with" in the opening sentence, resulting in a smooth translation. In fact, there are quite a few very smooth, crisp sentences throughout the introduction, especially in the first paragraph. Other favorable features of E29's translation include: starting the objective-of-the-study paragraph with the "the objective … is;" using "formulated" for 構築; translating 実験方法 as "methods and materials," which is an English-language convention; and correctly understanding "the effects of the blood chlorine content." In a clever move, E29 replaced the 一方 separating the topics of syringes and collection tubes in the Results section with a new paragraph. This may be unacceptable for patent and legal writing where the client wants the target text to appear in mirror image with the source text. However, the translation instructions say that the translation is for inclusion a journal article where such matching may not be important.

Some Things to Consider: E29 showed some unnatural word usage ("lack of divulging risks") and using long strings of nouns or nouns and adjectives when English would use more verbs and adverbs ("simultaneous proper disposal," "waste emission location"). "Emit" and "emission" are usually not used for this type of bulky solid waste, but more for gas and liquids. E29 often translated 処理 as "disposal" when it should probably have been "treatment" or should have just been ignored after incineration or decomposition. In the sentence "As most treatment is done via outsourcing…,"ものの was translated as "as" (meaning because), but this is a contradiction, meaning many are outsourcing, but few are doing it well and it's risky.

There were several errors of misunderstanding. "Although polypropylene has shown both complete oxidative degradation and the ability to detoxify and sterilize Escherichia coli. (SCWO decomposes polypropylene and destroys E. coli.) Like others, E29 called the SUS304 needle a syringe, and then misinterpreted subsequent sentences to fit that notion. In the sentence "residual TOC concentration and TOC conversation rate were used as indices for the data," perhaps E29 mistook "分解" for "分析." Again, in the translation "by also taking note of its breakdown and elimination of solid residue" E29 misread a word with 分 in it (reading 分離 as 分解) and misinterpreted the 留意 phrase (see E26). Such mix-ups suggest that E29 may not have proofread the translation.