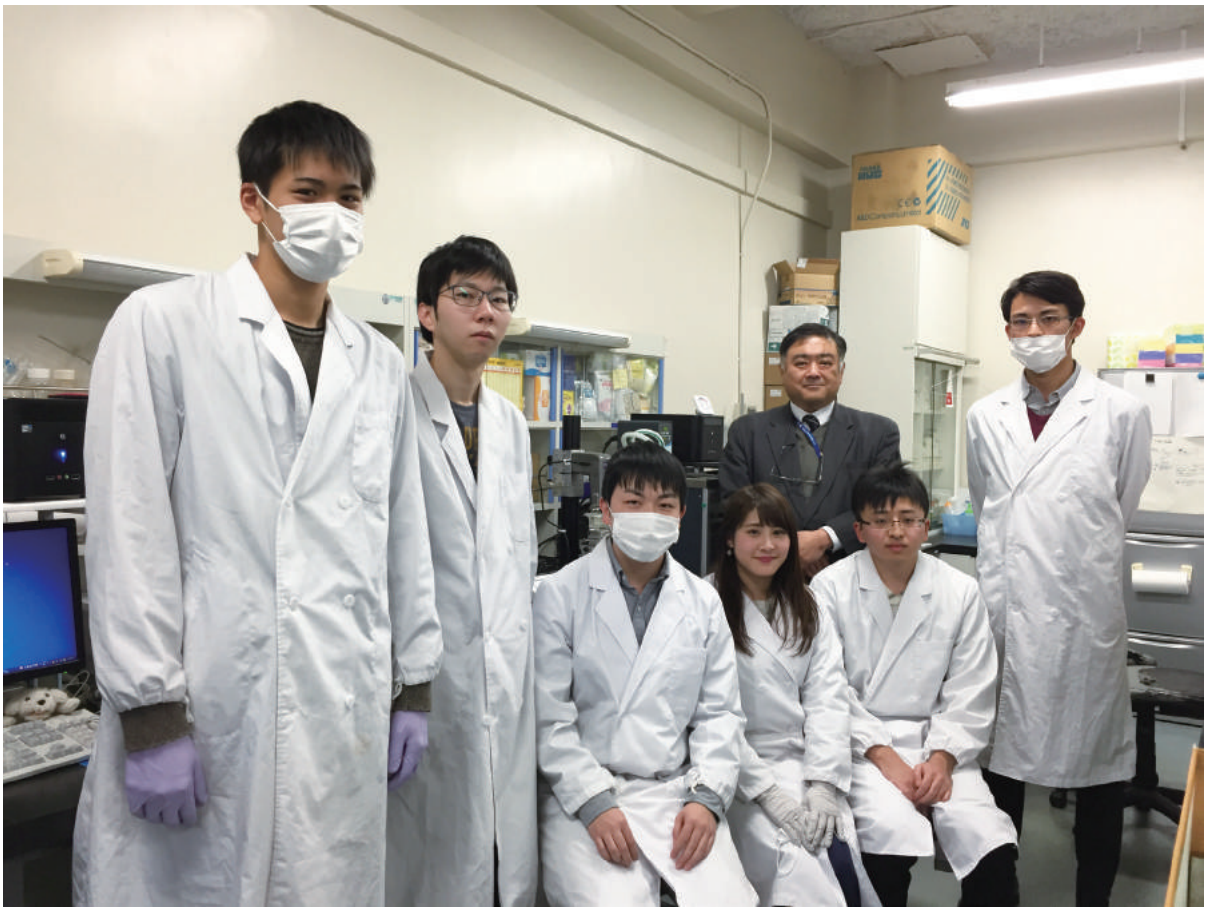
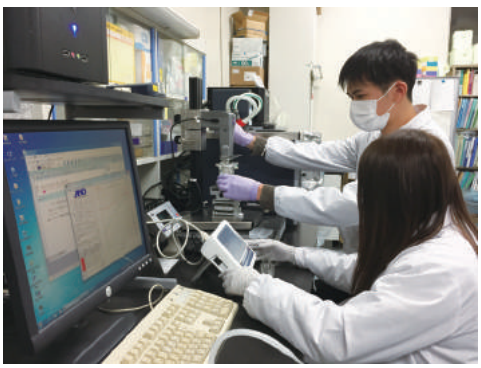
Discover Precision

INTERVIEW WITH

Professor Asaka, Tokai University, School of Engineering, Department of Applied Chemistry

“Is there a rheometer that can measure viscosity without damaging the sample?
We want to return the joy of eating to people who have eating disorders or dysphagia.”



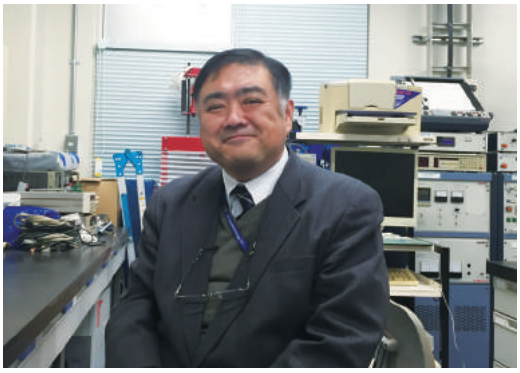


RV-10000A Tuning Fork Vibro Rheometer

"We want to find ways to help the many patients that are affected by pulmonary aspiration[1]"

In 2004, Professor Asaka began to research on semi-solidifying nutrients for patients with dysphagia (difficulty swallowing) after being consulted by a registered dietitian of Tokai University Hospital.

As this research progressed, he has begun to use A&D's RV-10000A Tuning Fork Vibro Rheometer on variable viscosity nutrients.



Professor Asaka

We receive scientific research grants to research semi-solidification of nutrients.

Why did you choose to research this particular issue?

Asaka: Originally I started in the field of inorganic chemistry researching ceramics. One day a dietitian at Tokai University Hospital, Ms. Tokumaru (currently the director of nutritional management at Kanazawa University Hospital), came to me for some advice about patients with dysphagia. I offered my assistance with this research because I wanted to use engineering to help people.

It seems that almost every day there are accidents due to dysphagia.

Asaka: Aging or brain illnesses can cause patients to have difficulty swallowing which increases the risk of aspiration pneumonitis caused by water and foods entering the lungs during a meal. At worst, this can lead to death. The top 3 of causes of death in Japan are cancer, heart disease and pneumonia. Aspiration pneumonitis accounts for more than half of pneumonia-related death in patients over the age of 60.

What did you focus on when you began your research?

Asaka: The important physical properties involved in swallowing are viscosity, hardness, brittleness, adhesiveness, cohesiveness and elasticity. For the patients with dysphagia, we have to account for not only chewing but also swallowing, which means rheological properties are important.

What kind of research do you do?

Asaka: Since we started receiving scientific research grants in 2008, we have been researching the semi-solidification of nutrients. We research chemical substances that add an appropriate viscosity according to the type of nutrients and we are also developing nutrients catered to individual patient conditions. Considering the toil and trouble placed on the patient and their family who care for the patient, we believe that providing information on the preparation of dysphagia diets directly relates to increasing their QOL.

The RV-10000A Tuning Fork Vibro Rheometer that shows relationship between the shear rate and the viscosity is an essential tool to research variable viscosity nutrients.

You encountered A&D at an exhibition, didn't you?

Asaka: Yes, I did, though I've been using A&D' s electronic balances since I was a student. I was looking for viscometers that would be useful for my research and I found the SV Tuning Fork Vibro Viscometer at the exhibition currently known as Japan Analytical & Scientific Instruments Show (JASIS). That was 15 years ago, and I still use it for my research.

RV-10000A Tuning Fork Vibro Rheometer

What kind of viscometer were you looking for?

Asaka: Before the exhibition, I only knew about rotational viscometers. These viscometers were not suited for my research because they would destroy the solidified sample through measurement. As I was looking for a new viscometer, I found A&D's model. A&D's viscometer measures the viscosity by only minutely resonating small sensor plates in the sample causing less damage to the sample. This was exactly the viscometer that I was looking for.

The software helps instill basic skills as it allows us to set acceptability criteria. Thanks to that, even our new employees make almost no errors now. If only we had such a useful tool like this earlier.

In addition to the SV Series, you now use RV-10000A recently.

Asaka: The SV Series is great viscometer, but its amplitude and frequency are fixed. So we cannot see the correlation between the shear rate and the viscosity. Newtonian fluids, e.g. water, have stable viscosity even if shear rate is changed. However, the viscosity of non-Newtonian fluids, such as nutrients which I'm studying, changes depending on the shear rate. The RV-10000A is the only rheometer that can determine the correlation between the shear rate and the viscosity without destroying the sample. My current research uses the RV-10000A to measure variable viscosity nutrients.

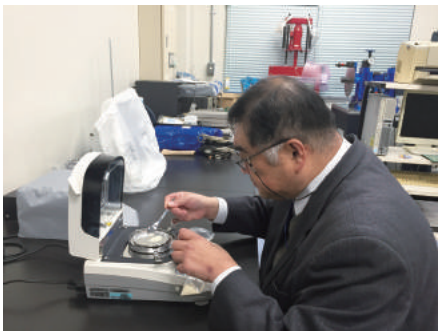
When are variable viscosity nutrients used?

Asaka: Patients who are unable to consume food from their mouths often have a tube inserted into their digestive tract to introduce liquid food (enteral nutrients) and as surgical techniques improve nutrients are increasingly added directly to the stomach by gastrostomy. However, this can sometimes cause dehydration due to diarrhea, which can in the worst case lead to death. Variable viscosity nutrients are needed to prevent this problem of dehydration so that a gastrostomy can effectively supply nutrition. Patients may get diarrhea when the nutrients are directly put into their stomachs. We are experimenting with thickening the nutrients to increase the travel time through the intestine to ensure slow-paced digestion and that water is also absorbed into the body. But now, awareness of this issue is not high yet. I want to continue my research with the RV-10000A to find promising results.

Eating is enjoying. We want to ensure people can enjoy eating from their mouth.

Your students seem passionate about this research.

Asaka: I greatly appreciate their hard work. I think that all people should be able to enjoy eating and I want to work with my students on research that can ensure this truth. On a personal note, recently a person close to me died due to complications from aspiration pneumonia and I want to do more to help.



MX-50 Moisture Analyzer

You also use our MX-50 moisture analyzer, don’ t you?

Asaka: It's really useful. It can measure moisture rate in short time and output the data to a PC easily with software. A&D is always helping me.

We would like to thank Professor Asaka for taking the time to do this interview.

(Interviewer: A&D Company, Limited Sales Promotion Division)

Note 1: Pulmonary aspiration: The act of inhaling fluid or a foreign body into the bronchi and lungs.
Note 2: The velocity that causes shear to the sample. The unit of measure is 1/sec.

COOPERATION

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Established Dec, 1942
Established (School of Engineering) Apr, 1950
Number of students (School of Engineering) 6,215 (As of May, 2017)

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