



The Australian Society of Rheology is presenting a national series of lectures, which is open to anyone interested in the flow and deformation of matter. The next event in the series will be held online.

Calendar details

Date:	Monday, April 17, 2023
Time:	03:00 to 04:30 PM (Melbourne, Australia)
Event Registration Link:	https://www.eventbrite.com.au/e/australian-society-of-rheology-seminar-17-april-2023-registration-589962613057

Invited lecture

Prof. Kyung Hyun Ahn

(School of Chemical and Biological Engineering, Seoul National University, Seoul, Korea)

Presentation Title: Technical issues in battery manufacturing

Abstract:

Due to the issues in global warming and carbon neutrality, automobile industry recently experiences a dramatic paradigm shift. Major companies already declared that they would not produce combustion engine vehicles anymore no later than 2030. As the only option to replace combustion engine is the electric vehicle, battery market is growing rapidly much faster than expected. The global sales are already \$120.4 billion in the year 2020 and is expected to be \$279.8 billion in the year 2027. As the change is so dramatic, the market is in short supply with a lot of technical issues. The suppliers have to secure both productivity and quality, but it is not so easy to make both ends meet. The problem is that we don't have enough knowledges to settle down all technical issues and make money. In most cases, the batteries are manufactured by coating process, which is defined as a process in which gas is replaced by liquid on a substrate. The coating process consists of three unit processes. As the materials typically contain a large amount of particles (active materials and conducting particles) with polymers (binders) and solvents, they continuously change microstructures during slurry preparation, flow, and even drying. However, little is known about the flow characteristics of such complex fluids and less is known about how to design and control the process. Therefore, for better control of the process and for better quality of the product, we need to understand the transport phenomena of these complex fluids, which rarely has been studied in the past. Since the materials experience high shear flow due to the small gap of tens of micrometers and the dispersion of pigment is critical to the coating performance, it is important to precisely control the flow behavior, which is highly dependent upon the rheology of the material. Therefore, it is necessary to incorporate the concept of transport phenomena into materials processing and to develop the methodology to quantitatively analyze the complexity observed in both materials and processing. And it should be reflected in the material design. It will be a big challenge to establish a systematic protocol to characterize the materials and maintain uniform quality during manufacturing. In this presentation, I will talk about the technical issues in battery manufacturing and propose the strategy to get over these issues. They are not only the issues of the manufacturer alone but require all the competences of the society including government and universities. It is a new challenge and will determine the prosperity of the future.



Speaker's biography



Careers

2009.3 – present	Professor, Seoul National University
2012.9 – present	Director, Center for nano-structured polymer processing technology
2018.6 – present	Director, Center for coating materials and processing
2019.1- 2020.12	President, Korean Society of Rheology
2015.8 – 2017.7	Vice Dean of Academic Affairs, College of Engineering
2013.8 – 2014.2	Visiting Professor, Delaware University, USA
2004. 2 – 2009.3	Associate Professor, Seoul National University
2000. 6 – 2004.1	Associate Professor (BK21), Seoul National University
1994. 9 - 2000. 5	Senior Researcher, R&D Center, Samsung Cheil Industries Inc.
1993. 9 - 1994. 8	Research Associate, Institute for Chemical Researches, Kyoto University, Japan
1992. 2 - 1993. 8	Research Associate, Department of Chemical Engineering, University of Wisconsin, USA
1991. 9 - 1991.12	Research Fellow, Department of Chemistry, University of Wisconsin, USA

Education

1988. 3. - 1991. 8.	Ph.D. in Seoul National University (Chemical Engineering)
1986. 3. - 1988. 2.	MS in Seoul National University (Chemical Engineering)
1981. 3. - 1986. 2.	BS in Seoul National University (Chemical Engineering)

Others

- Editorial board member, Rheologica Acta
- Editorial board member, Journal of Rheology
- Editorial board member, Korea-Australia Rheology Journal
- Regional editor, Journal of the Society of Rheology, Japan
- Expert subcommittee member, Institute for Chemical Research, Kyoto University, Japan

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