Preparation and Application of Immiscible Solutions

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I will give a lecture on "immiscible solution systems" with focus on the following topics.

Topic 1: Polymer blends have been used in the manufacture of functional materials that cannot be produced by simple synthetic technology. "Engineering Plastics" by mixing two or more components results in high performance compared with the inherent performance of each component. Multiple components become miscible (compatible) or immiscible (incompatible) depending on the kind of material, the mixing process and conditions, and the molding (coating/drying) process. In this lecture, I will introduce the history and basic concept of polymer blends and discuss the change of mechanical properties of crosslinked epoxy films with acrylic resins or crosslinked acrylic particles.

Topic 2: Electric power consumption has been increasing at a breakneck pace over the last several decades. Electricity is supplied by power plants by burning petroleum, coal, gas, and radioactive materials. Recently, measures aimed at the use of renewable (solar power, hydraulic power, wind power, geothermal power, etc.) as an alternative have been taken because of such problems as limited resources, global warming, and nuclear power safety. Among those renewable energy systems, solar power generation has been put to practical use and the development of low-cost solar cells that are capable of large-scale production is expected. In this lecture, I will talk about organic photovoltaics and the application of “immiscible solution systems (nanoparticle dispersions)” in those solar cells.

ABOUT THE SPEAKER

Masahide Kawaraya was born in Kobe, Hyogo Prefecture in 1961. He graduated from Kwansei Gakuin University in 1986 and received his PhD in 2006 at Tohoku University. He started working at Kansai Paint Co., Ltd. as a laboratory researcher in 1980 and was dispatched to the University of Texas, Austin, USA in 1991 to study polymer blends. In 2007, he moved to Peccell Technologies, Ltd. where he was involved in organic-type solar cell development. He left Peccell for Mikuni Color, Ltd. in 2009. In 2011, he was promoted to chief of Mikuni Color's laboratory that opened at The University of Tokyo Research Center for Advanced Science and Technology, where he conducted research on next-generation photovoltaic systems. Since 2017, he has been the subcommittee chief of RATO (Research Association for Technology Innovation of Organic Photovoltaics). He is interested in the engineering of dispersions with functional nanoparticles, such as semiconductors for photovoltaics, and in the coating process using those dispersions to realize good semiconductor layers.