

## SUSUMU ARAI

Susumu Arai is an associate professor of chemistry at Shinshu University, Japan. He received a BS in chemistry in 1986 from Shinshu University. He then started to work as an engineer in Nagano Prefecture. In 1998, he was awarded a PhD by Shinshu University. He started to work as a research assistant in 1999, and subsequently became an associate professor in 2004 at Shinshu University.

One of his major research interests is lead-free solder plating. He developed tin alloy solder platings, including tin-silver, tin-copper, and tin-silver-copper solder plating.

His most recent work has focused on nanoparticle composite platings, especially carbon nanotube composite platings.

Prof. Arai was awarded a Mate '97 Excellent Paper Prize for the development of tin-silver alloy solder bump formation by electrodeposition by the Japan Welding Society in 1997. He also received the Shinpo Prize from the Surface Finishing Society of Japan in 1998 for research on the tin-silver binary alloy and tin-silver-copper ternary alloy platings for lead-free solder plating. He is a member of ECS, the Electrochemical Society of Japan, the Surface Finishing Society of Japan, Japan Welding Society, the Chemical Society of Japan, the Japan Society for Analytical Chemistry, the Japan Institute of Metals, the Japan Institute of Electronics Packaging and the Japan Society of Corrosion Engineering. In addition, he has been a councilor of the Surface Finishing Society of Japan since 2004.

### **Characteristics of Metal-CNT Composites Prepared by Plating Technology**

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Metal-carbon nanotube (CNT) composites were prepared by plating techniques and their properties were characterized. Metal-CNT composite films, such as Ni-CNT composite films, formed by an electroplating technique showed good thermal conductivity and superior frictional properties. Cu-CNT composite films formed by the electroplating technique showed excellent field emission properties. A light emitter using the Cu-CNT composite film as an electron emitter was manufactured by way of trial and the luminescence properties were measured. Metal-CNT composite films were also prepared by an electroless plating method and their frictional properties were evaluated. Metal coating technology of CNTs was successfully developed using the electroless plating technique. The metal coating evidently improved the wettability of CNTs and molten aluminum. Metal nano particles deposited on CNTs were also prepared by the electroless plating technique. Gold nano particles deposited on CNTs showed obvious catalytic properties for the oxidation reaction of glucose to gluconic acid.