



Tetsu Yonezawa

Birth: 1965/08/14 Kobe, JAPAN

- 1992 Exchange PhD Student, Swiss Federal Institute of Technology, Lausanne
- 1994 Dr. Eng. from Univ. Tokyo (Applied Chemistry)
- 1994 JSPS Postdoctoral fellow
- 1994 Postdoctoral fellow in IRC (Institute for Research on Catalysis)
- 1996 Assistant Professor of Kyushu Univ. (Organic Synthesis Lab.)
- 2001 Associate Professor of Nagoya Univ. (Nanoparticles, Ceramics)
- 2002 Associate Professor of Univ. Tokyo (Metal Complex, Nanoparticles)
- 2009 Full Professor of Hokkaido Univ.

Awards:

- 2002 Carrier Award, Colloid and Interface Div., Chemical Soc. Jpn.
- 2005 Young Scientist Lectureship Award, Kansai Div., SPSJ (Society for Polymer Science, Japan)
- 2009 Hot Article Award, Analytical Sciences
- 2011 SPSJ (Society for Polymer Science, Japan) Hitachi Chemical Award

Title

New Copper Fine Particle Systems for Low Temperature Sintering

Abstract:

A conductive paste was prepared with submicrometer-sized copper fine particles of 130 nm. After drying, an oxidation-reduction two-step sintering process was proposed for these submicrometer-sized copper fine particles to obtain low-resistivity layers at a very low temperature as 200 or 150 C. The optimized conditions gave a low resistivity of $8.2 \times 10^{-6} \Omega \text{ cm}$, even when the particles were covered by a common polymer. Our results suggest that the formation of the small copper oxide prominences on the surface of the copper fine particles could be reduced at low temperatures, forming connected submicrometer-sized metallic copper particles. Recently, we have further succeeded to establish a novel low cost sintering process of copper fine particles to copper conductive layer at as low as 100 °C without reductive gas flow. Sintering of a mixture of copper particles and copper-based metal-organic-decomposition (MOD) ink, gave a copper film with high packing density and low resistivity ($9 \times 10^{-6} \Omega \text{ m}$). This novel process may open a new strategy in the field of printed electronics.