Preparation of Metal Nanoparticles and Fine Particles for Low Temperature Sintering

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Metal nanoparticles are promising materials for conductive inkjet printing as well as past printing because of the melting temperature depression with their smallness. Noble metal nanoparticles such as Au and Ag have been widely studied for this purpose. However, the high cost of noble metals and their sintering temperature still limit the practical applications. Also, copper nanoparticles and fine-particles are becoming a next candidate for this purpose. Copper nanoparticles and fine-particles are becoming a next candidate for this purpose. On the other hand, tin nanoparticles can be selected another good candidate for this purpose according to their low melting temperature.

We have realized several low temperature sintering methods of copper nano- and fine particle systems.[1-4)] Copper complex inks could also be used for electro conductive circuits.[1)] The size of the obtained copper fine particles can be controlled by the molecular weight of the stabilizing polymers.[2)] The mix of copper fine particles and copper complex improve the conductivity after sintering.[3)] Low temperature decomposable polymers can also be used for low temperature sintering of copper fine particles.[4)]

Also, we have also developed Sn nanoparticles[5)] as an alternative conductive ink material, according to its much lower cost and melting point. The resistivity of the sintered films was close related the particle size and the best obtained resistivity is 1.1×10^{-5} Ω·m which is 10^2 times higher than that of the bulk Sn.

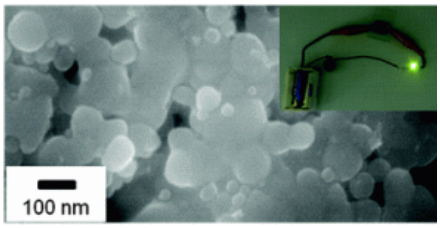

Figure 1. Sintered layer of Sn nanoparticles for an electro conductive materials.

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