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Formation of Highly-Ordered Nanoparticle Structure Using Controlled Gas-Liquid Interfacial Plasmas TOSHIRO KANEKO, TAKASHI HARADA, RIKIZO HATAKEYAMA, Department of Electronic Engineering, Tohoku University — Highly-ordered metal nanoparticle structures have high catalytic activity and unique photosensitive reactivity due to their size effects. To realize the highly-ordered nanoparticles, nanoparticles conjugated with carbon nanotubes are synthesized using a novel plasma technique combined with introduction of ionic liquids under low gas pressures. It is revealed that the discharge plasma and ionic liquid interfacial field can be controlled and be advantageous to directly synthesize abundant metal nanoparticles by the plasma reduction of metal chloride in the nano-spaces of the carbon nanotubes. As a result, mono-dispersed and high-density metal nanoparticles intercalated into the carbon nanotubes are synthesized and the nanoparticles are found to be well-aligned in the interlayer of the carbon nanotubes. This method could contribute to supplying a considerable amount of highly-ordered nanoparticles available for the development of unique nanoelectronics devices. Furthermore, we try to control the nano-scale structure of the plasma at the gas-liquid interface using strong magnetic fields up to 4 tesla and the highly-ordered nanoparticles are expected to be synthesized in accordance with the plasma structure.

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