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Synthesis, transport, and retention of tin nanodroplets in a magnetron sputtering source combined with a capacitively-coupled plasma K. SASAKI, K. TAKANARI, Hokkaido University — The intention of this work was the development of a method for coating metal nanodroplets with thin films having high melting temperatures. To realize this process technology, we combined a magnetron sputtering plasma for synthesizing metal nanoparticles with a capacitively-coupled plasma (CCP) for retaining and heating synthesized nanoparticles. The magnetron sputtering source with a tin target was operated at a high pressure of 400 mTorr. The high pressure induced the condensation of tin atoms in the gas phase, resulting in the formation of tin nanoparticles. The nanoparticles were transported downward, and were trapped in the sheath electric field near the planar electrode for the CCP discharge. The formation, the transport, and the retention of nanoparticles were monitored by laser light scattering. Collected tin nanoparticles did not have agglomerated shapes, suggesting that tin nanoparticles were melted when they were stored in the CCP discharge. The surfaces of tin nanoparticles were oxidized. When we introduced methane before the collection, we observed core-shell nanoparticles without oxidization. Tin nanoparticles were coated with amorphous carbon films by plasma-enhanced chemical vapor deposition of methane.

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