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Synthesis of core-shell nanoparticles with tin-droplet core using magnetron sputtering dusty plasma K. SASAKI, H. KOYAMA, Hokkaido University — Core-shell nanoparticles with metal cores having low melting points can be applied to thermal management technologies, but a problem is the destruction of the shell film by the thermal tension when the core metal melts. A solution to this issue is to deposit the shell film onto the droplet of the core metal. In this work, we synthesized tin nanoparticles using high-pressure magnetron sputtering. The magnetron sputtering source was installed at the top of a vacuum chamber, and tin nanoparticles were transported to a capacitively coupled plasma (CCP) produced at the bottom. Tin nanoparticles were trapped above a ring CCP electrode by the sheath electric field, and they were heated by the heat flux from the plasma to realize their melting. Amorphous carbon films were deposited on tin droplets by introducing CH_4 into the CCP plasma. Another method to form shell films was the sputtering deposition of Cu using another magnetron source. Core-shell nanoparticles thus synthesized were collected by applying a positive bias voltage to a planar electrode. We confirmed the robustness of tin-carbon core-shell nanoparticles by heating them in a tunneling electron microscope.

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