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Plasma-induced processing in microdroplets for nanoparticles synthesis MASANAO TSUMAKI, Osaka University, YOSHIKI SHIMIZU, National Institute of Advanced Industrial Science and Technology, TSUYOHITO ITO, Osaka University — Plasma processing in microdroplets is studied, as the solute of organic compounds in the microdroplets is a raw material for nanoparticles synthesis. Synthesis of ZnO nanoparticles with wurtzite structure and control of their size distribution with regulating the zinc acetate ($\text{Zn}(\text{Ac})_2$) solution concentration are achieved. The plasma is generated by means of dielectric barrier discharges in He gas flow, and the generated particles are analyzed by photoluminescence spectroscopy, scanning electron microscopy, and transmission electron microscopy. The size distribution shifted with the increase of $\text{Zn}(\text{Ac})_2$ concentration, and the average sizes are expected by assuming one ZnO nanoparticle is formed from one microdroplet with known $\text{Zn}(\text{Ac})_2$ density. The properties of nanoparticles are independent of the solution concentration within the tested range (0.5-2 mM), except of their sizes. The results strongly suggest that one microdroplet is a closed reaction area, thus providing certain controllability of the generated nanoparticles.

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