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Investigation on evaporation of Ti feedstock and formation of precursor TiO molecules during TiO₂ nanopowder synthesis in induction thermal plasma with time-controlled feedstock injection NAOTO KODAMA, KENTARO KITA, YOSUKE ISHISAKA, YASUNORI TANAKA, YOSHIHIKO UESUGI, TATSUO ISHIJIMA, Kanazawa University, SHIORI SUEYASU, KEITARO NAKAMURA, Nisshin Seifun Group Inc., KANAZAWA UNIVERSITY TEAM, NISSHIN SEIFUN GROUP INC. TEAM — The method using inductively coupled thermal plasma (ICTP) is very effective for nanopowder (NPs) synthesis. However, NPs formation process in the ICTP torch has not been clarified. In this study, the two-dimensional spectroscopic observation was carried out for ICTP torch during TiO₂ NPs synthesis process with time-controlled feedstock injection. In order to investigate evaporation process of feedstock and formation process of precursor molecules, Ti feedstock was intermittently injected into the ICTP. Ti I (453.32 nm) and TiO (621 nm) were observed by using an imaging spectroscopic system. Observation results show that injected Ti feedstock was evaporated in the ICTP. Then, generated Ti atoms were transported to downstream of the torch by gas flow and were diffused to the radial direction by density gradient. High concentration of TiO molecular gas was formed only around central axis region in the torch.

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