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Gold Nanoparticle Synthesis by 3D Integrated Micro-solution Plasma in a 3D Printed Artificial Porous Dielectric Material NAOYA SOTODA, KENJI TANAKA, TATSURU SHIRAFUJI, Osaka City University — Plasma in contact with $HAuCl_4$ aqueous solution can promote the synthesis of gold nanoparticles. To scale up this process, we have developed 3D integrated micro-solution plasma (3D IMSP). It can generate a large number of argon microplasmas in contact with the aqueous solution flowing in a porous dielectric material. The porous dielectric material in our prototype 3D IMSP reactor, however, consists of non-regularly arranged random-sized pores. These pore parameters may be the parameters for controlling the size and dispersion of synthesized gold nanoparticles. We have hence fabricated a 3D IMSP reactor with an artificial porous dielectric material that has regularly arranged same-sized pores by using a 3D printer. We have applied the reactor to the gold- nanoparticle synthesis. We have confirmed the synthesis of gold nanoparticles through the observation of a plasmon resonance absorption peak at 550 nm in the $HAuCl_4$ aqueous solution treated with 3D IMSP. The size and distribution of the synthesized gold nanoparticles are under investigation. We expect that these characteristics of the gold nanoparticles can be manipulated by changing pore size and their distribution in the porous dielectric material.

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