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Nanoporous gold thin film synthesis by plasma-assisted freeze templating: irradiation of cryoplasma onto frozen solution NORITAKA SAKAKIBARA, TSUYOHITO ITO, KAZUO TERASHIMA, The University of Tokyo — Plasma/liquid interfaces are now receiving increasing attention at wide range of applications. Here, we present a plasma-assisted freeze templating (PFT) method for materials processing, which uses a new type of plasma/liquid interface, i.e., plasma/ice interface. In PFT, micro- or nano-sized liquid layer that is formed on a frozen solution is used as a reaction field, in which chemical reactions are encouraged by reactive species from plasma. In this study, we have realized synthesis of nanoporous gold (NPG) self-supported thin film by PFT, only by irradiating helium cryoplasma jet onto frozen chloroauric acid solution. Auric solution was frozen to be concentrated in thin liquid layer on the ice surface, because auric ions are expelled from growing ice phase, on which cryoplasma was irradiated to reduce the auric ions. We can provide abundant reactivity of plasma without melting of the frozen solution, because the gas temperature in cryoplasma is controlled at cryogenic temperature [1]. PFT has accomplished surfactant-free, area-selective and one-step fabrication of NPG, that is more advantageous than conventional solution chemistry methods [2]. PFT is not only effective method for fabricating NPG thin films, but also expected as a novel technique for nano-engineering. [1] N. Sakakibara and K. Terashima, J. Phys. D: Appl. Phys. **50** (2017) 22LT01. [2] M. Christiansen *et al.,* J. Mater. Chem. A **6** (2018) 556.

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