Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Characterization of self-assembled silver pattern forming in argon and ammonia mixed atmospheric pressure plasma NAOYA KIHARA, ELLA BLANQUET, Kyoto University, The University of Shiga Prefecture, YU HIRAOKA, Kyoto University, OSAMU SAKAI, Kyoto University, The University of Shiga Prefecture — Self-assembly fractal-like silver pattern was observed when the silver nitrate solution was dried with the gas flow of argon and ammonia mixed atmospheric plasma. This process can generate hydrazine, which is a powerful reductive agent, and silver particles are deposited from silver nitrate self-assembly [1] and form fractal-like pattern in sub-μm order. This pattern shows abnormal optical response, so our self-assembly plasma process will be likely to bring a good method to make optical metamaterials because of its simplicity. In addition, we proposed that this process is applicable for widely sensitive metamaterials process, since we made sub-μm and several ten micrometers mingled microstructure through the plasma process with the use of micro particles. We diagnosed the characteristics of this typical pattern by Fourier transform infrared spectroscopy and numerical simulation, and confirmed that the pattern was widely sensitive from mid-infrared to far-infrared region. We aim at controlling the typical response phenomena and making widely sensitive optical metamaterials with changing deposition condition.

[1] K. Urabe, Y. Hiraoka, and O. Sakai: Plasma Sources Sci. Technol. 22 (2013) 032003.

Naoya Kihara
Kyoto University, The University of Shiga Prefecture

Date submitted: 18 Jun 2015 Electronic form version 1.4