Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Plasma electrolysis using atmospheric dc glow discharge in contact with liquid for synthesis of metal nano-particles[1] NAOKI SHIRAI, YUDAI SHIMOKAWA, TAKUYA AOKI, SATOSHI UCHIDA, FUMIYOSHI TOCHIKUBO, Tokyo Metropolitan University — For the synthesis of metal nanoparticles in aqueous solution, we propose dual plasma electrolysis, which consists of Hoffman electrolysis apparatus with two atmospheric glow discharge plasmas as electrodes instead of conventional metal electrodes immersed in a liquid. The plasma anode irradiates positive ions to the solution surface while the plasma cathode irradiates electrons to the solution surface. The dual plasma electrolysis system enables us simultaneously to investigate the influence of electron and positive ion irradiation to a solution surface on metal nanoparticle generation at the same current. We used aqueous solutions of $AgNO_3$, $HAuCl_4$ and their mixture. In dual plasma electrolysis with $AgNO_3$, Ag nanoparticles were only synthesized on the plasma cathode side. This means that Ag nanoparticles are generated via the reduction of Ag^+ by electrons. With $HAuCl_4$ solution, Au nanoparticles were synthesized on both the plasma anode and plasma cathode sides. Ion irradiation with the plasma anode is more effective than electron irradiation for Au nanoparticle synthesis. This finding suggests that positive ions from the plasma trigger the dissociative reaction of $AuCl_4^-$ at the plasma-liquid interface.

[1]This work was supported financially in part by a Grant-in-Aid for Scientific Research on Innovative Areas (No 21110007) from MEXT, Japan.

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Date submitted: 13 Jun 2013 Electronic form version 1.4