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**Atmospheric inductively coupled Ar/H<sub>2</sub> plasmas jet for low-temperature deposition of Cu Thin Film on Polyimide** PENG ZHAO, Shizuoka University, WEI ZHENG, Research and Technology Center, Yazaki Corp., YUEDONG MENG, Institute of Plasma Physics, Chinese Academy of Sciences, MASAAKI NAGATSU, Shizuoka University — For fabrication of future flexible electronic devices and depositing Cu thin films on polyimide substrate at low temperature, an atmospheric inductively coupled plasma jet driven by a 13.56 MHz radio frequency (RF) power is developed. In previous studies, we found that by adding a fractional amount of H<sub>2</sub> gas into Ar plasma, quality of Cu film was significantly improved. But under air atmosphere, the oxidization of deposited film is inevitable. So we developed the technology in nitrogen atmosphere. We investigated the plasma jet properties of Ar plasma in air, Ar/ H<sub>2</sub> plasma in air and Ar/ H<sub>2</sub> plasma in nitrogen atmosphere, to discuss the effect of adding H<sub>2</sub> to Ar plasma and nitrogen background on plasma properties. The plasma gas temperature diagnoses and chemical reaction research during deposition were performed by OES. The plasma jet non-equilibrium numerical simulations were also carried out for thermal and transport properties during deposition. The effects on Cu films quality were studied by means of XPS and SEM. All the plasma properties and the results of Cu film would give us an insight on the mechanism and the possibility of improving the process.

Peng Zhao  
Shizuoka University

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