

Abstract Submitted
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Effect of the gas temperature and pressure on the nucleation time of particles in low pressure Ar-C₂H₂ rf plasmas JIASHU LIN, Kyoto Institute of Technology, MARIE HENAULT, Universit d'Orlans/GREMI, SAGI ORAZBAYEV, Al Farabi Kazakh National University, LAFA BOUFENDI, Universit d'Orlans/GREMI, KAZUO TAKAHASHI, Kyoto Institute of Technology, AL FARABI KAZAKH NATIONAL UNIVERSITY COLLABORATION, KYOTO INSTITUTE OF TECHNOLOGY TEAM, GREMI TEAM — Particle formation in low pressure plasmas is a 3-step process. The first one corresponds to the nucleation and growth of nano-crystallites by ion-molecular reactions, the agglomeration phase to form large particles, and the growth by radical deposition on the particle surface. The nucleation phase was demonstrated to be sensitive to gas temperature and pressure. In this work, time of nucleation phase of particles formation in low pressure cold rf C₂H₂/Ar plasmas studied by varying gas temperature from 265 K to 375 K, gas pressure from 0.4 mbar to 0.8 mbar and rf power from 6 W to 20 W. The ratio of C₂H₂/Ar is fixed to 2/98 in terms of pressure. Several previous works reported that particle formation takes a few sec at room temperature in C₂H₂ plasmas and the time is much shorter than 0.1 s in SiH₄ plasmas. Time evolution of self-bias voltage was mainly used to determine nucleation time. The self-bias voltage was modified by phase transition between the steps from nucleation to coagulation. The experimental results showed that the nucleation time increased with gas temperature, decreased with gas pressure and discharge power. At constant gas pressure of 0.4 mbar and discharge power of 6 W, for example, the nucleation time increased from 5 sec to 30 sec with increas

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