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Extraordinary field emission diamond film using Microwave Plasma Jet Chemical Vapor Deposition JING-SHYANG YEN, National Taipei University of Technology, CHUN-YU LIN, National Taipei University of Technology, Department of Mechanical Engineering, JWO-SHIUN SUN, National Taipei University of Technology, Department of Electronic Engineering, CHI-WEN LIU, National Taipei University of Technology, Department of Mechanical Engineering, CHII-RUEY LIN, Department of Mechanical Engineering, Minghsin University of Science and Technology, HUA-YI HSU, National Taipei University of Technology, Department of Mechanical Engineering, MING-CHIEH LIN, Department of Electrical and Biomedical Engineering, Hanyang University, — The research and development of a microwave plasma jet chemical vapor deposition for diamond film growth have been carried out in this study. A 3D adaptive finite element method electromagnetic model of microwave plasma interactions is constructed to get more understanding of the operating characteristics of diamond film growth. The whole system has been simulated self-consistently. In addition, a thin diamond film has been successfully fabricated according to the identical conditions predicted in the simulations. The SEM image shows that the deposited diamond particles are uniformly distributed on the substrate with the size of 1um. The field emission from the diamond film grown from this MPJCVD shows extraordinary properties, i.e., extremely low turn-on voltage and high current density. This work is promising in surface hardening and bright field electron emission sources.

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