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Design and development of field emission based rising sun magnetron for industrial applications¹ LING LI, KAVIYA ARANGANADIN, MING-CHIEH LIN, Department of Electrical and Biomedical Engineering, Hanyang University, Seoul 04763, South Korea, HUA-YI HSU, Department of Mechanical Engineering, National Taipei University of Technology, Taipei 10608, Taiwan — The magnetron is widely used in radars and also well-known as a low-cost microwave source for microwave ovens, which generates microwaves based on the interaction of a stream of moving electrons under a cross electric and magnetic fields with a series of open coupled metal cavity resonators. In this work, a field emission based magnetron is investigated for industrial applications as an easier configuration and longer lifetime can be expected. The design and development are performed using a conformal finite-difference time-domain particle-in-cell simulations. The goal of this research is to design and develop magnetrons operating at a frequency of 2.45 GHz and at a working power of >3 kW for industrial applications. A preliminary design after the optimization could achieve the required power at a high efficiency of >78%. One of the advantages is the fabrication and assembly can be much simplified compared with those of a conventional strapped magnetron based on a thermionic cathode.

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