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Design and development of field emission based high power magnetron for wireless power transmission[1] KAVIYA ARANGANADIN, LING LI, 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, MING-CHIEH LIN, Department of Electrical and Biomedical Engineering, Hanyang University, Seoul 04763, South Korea — Space-based solar power is the concept of collecting solar power in outer space and distributing it to Earth. Potential advantages of collecting solar energy in space include a higher collection rate and a longer collection period without a loss to a diffusing atmosphere. The cost of the wireless power transmission (WPT) is about 30% of the total cost of the space-based solar power system (SSPS). The main portion of the high cost is on the development and transportation due to the large number and mass of the magnetrons used in the WPT subsystem. In this work, we propose to design and develop a field emission based rising-sun magnetron capable of producing higher power at one or two orders of magnitude than those commercially available on the market today so that the development and installation cost of an SSPS can be dramatically reduced. The first goal of this research is to design and develop magnetrons operating at a frequency of 2.45 GHz and at a power level of >100 kW for WPT. A preliminary design after the optimization could achieve the required power at a high efficiency of >80%. Additional advantage is the fabrication and assembly can be much simplified compared with those of a conventional strapped magnetron.

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