

Abstract Submitted  
for the GEC17 Meeting of  
The American Physical Society

**A novel linear microwave plasma source using circular  $TE_{11}$  mode and continuous line slot antenna** JU-HONG CHA, HO-JUN LEE, Department of Electrical Engineering, Pusan National University, Busan, South Korea — For conventional linear microwave plasma sources with co-axial TEM waveguide, there is relatively large resistive loss in inner conductor of the waveguide. The wave electric field is directed normal to the quartz window surface, which enhances electron loss. To improve performances of linear microwave plasma sources, a novel linear microwave plasma source suitable for large area deposition and etching processing has been developed. In the proposed plasma source, circular  $TE_{11}$  mode has been used for plasma generation. After mode conversion from rectangular  $TE_{10}$  to circular  $TE_{11}$ , 2.45 GHz microwave power is transferred to plasma via continuous line slot antenna along the wave propagation direction. The direction of radiated electric field is almost parallel to the quartz window. Diagnostics on the basic plasma properties using electrical probe and microwave cutoff probe confirmed that proposed source has better plasma generation efficiency compared with the conventional source. For 200 mTorr Ar plasma with 1 kW microwave input power, plasma density improvement about 80% was achieved. In addition, more stable impedance matching characteristics has been observed in proposed plasma source.

Ju-Hong Cha  
Department of Electrical Engineering, Pusan National University

Date submitted: 08 Jun 2017

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