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A New Compact Surface Wave Plasma Source for Multiple Plasma Source Setup Aimed for Depositing Large-area Diamond.¹ HYUN JONG YOU, OLEKSII GIRKA, Plasma Technology Research Center, National Fusion Research Institute — The large size and high quality diamond production has been one of the most challenging tasks for the diamond industry. A compact surface wave plasma source is newly developed as a part of multiple plasma source setup for large-area microwave (MW) plasma generation. The large-area MW multiple plasma source setup will be used for the large size diamond CVD. The single source is made to be compact and efficiently generate plasma in wide range of operating gases' compositions and pressures. In this source, the microwave can be fed by a waveguide or by a coaxial structure, forming an intense microwave field at the plasma generation region by a water-cooled coupling rod. Alumina plasma region of a conical crucible-type is surrounded by an aluminium nitride (AlN) cover. The AlN cover and downstream plasma region are cooled by the coupling rod and a tightly fitted aluminium (Al) water jacket. Efficient microwave coupling is significant advantage of the source since microwave electric field does not interact with any obstacles like cooling media as it is in surfaguide sources. The aim of the work is to present the new source design, results of microwave simulation, plasma generation and characterization for the CVD process of diamond films.

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