

Abstract Submitted
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A miniaturized plasma-based sheet electron beam source suitable for high power sub-THz generation NIKITA GURJAR, SAHIL JAIN, NIRAJ KUMAR, CSIR-Central Electronics Engineering Research Institute — Plasma cathode electron (PCE) gun has been used for the generation of a high-power microwave and terahertz signal. PCE guns are capable of generating cylindrical as well as sheet electron beams. Sheet electron beam offers high current density than the cylindrical electron beam for the same aperture area. It is preferred over cylindrical electron beam especially in sub-THz regime. Sheet electron beams are suitable for planar interaction structures which are easier to fabricate in sub-THz regime. In this work, a miniaturized plasma based sheet electron beam source has been designed and developed. The sheet electron beam has been propagated for more than 50mm inside the plasma assisted drift space without any assistance of external magnetic field. The propagated distance by sheet electron beam is sufficient to design the interaction structure of sub-THz oscillator. The beam aspect ratio has also been optimized to keep the fill factor around 70 %. The gun has been operated for the self-breakdown condition by applying the input voltage of 10-30 kV to generate the high current density (>50 A/cm²) sheet electron beam. This will help in the generation of high power sub-THz radiation.

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