

Abstract Submitted
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Plasma Shield ADY HERSHCOVITCH, Brookhaven National Lab —

The Plasma Shield is a vortex-stabilized arc that is employed to shield beams and workpiece area of interaction from atmospheric or liquid environment. A vortex-stabilized arc is established between a beam generating device (laser, ion or electron gun) and the target object. The arc, which is composed of a pure noble gas (chemically inert), engulfs the interaction region and generates an outward flow, thus, shielding it from any surrounding liquids (water) or atmospheric gases. The vortex is composed of a sacrificial gas or liquid that swirls around and stabilizes the arc. In current art, many industrial processes that involve ion and electron beams like, dry etching, micro-fabrication, machining, welding and melting are performed exclusively in vacuum, since guns, and accelerators must be kept at a reasonably high vacuum, and since chemical interactions with atmospheric gases adversely affect various processes. Various processes involving electron ion and laser beams can, with the Plasma Shield be performed in practically any environment (under water). It should allow for in situ repair of ship and nuclear reactor components, as well as in-air ion implantation of semiconductors. The plasma shield results in both thermal (since the plasma is hotter than the environment) and chemical shielding. The latter feature brings about in-vacuum process purity out of vacuum, and the thermal shielding aspect results in higher production rates. Experimental results will be presented. *Plasma Shield/Work supported by Accelaron, Inc., Connecticut Light & Power Co., US DOE funding under a NICE3 grant DE-FG41-01R110925, and Connecticut DEP.

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