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MAGPIE: A new linear plasma device for studying fusion relevant plasma-surface interactions[1] CORMAC CORR, CAMERON SAMUELL, BOYD BLACKWELL, JOHN HOWARD, JUAN CANESES, ROMANA LESTER, Australian National University, AUSTRALIAN NATIONAL UNIVERSITY TEAM
— Plasma-surface interactions are crucial to determining the success of ITER and the ultimate viability of generating fusion power under steady state conditions. The first walls of magnetic fusion reactors must sustain large particle and heat fluxes and present a major challenge to achieving fusion power. To answer fundamental questions about the science of plasma-surface interactions at the complex fusion boundary a new purpose-built linear plasma device, the prototype MAGnetized Plasma Interaction Experiment (MAGPIE), has been constructed at The Australian National University (ANU) to develop novel diagnostics and test materials under aggressive plasma conditions. In this work we employ optical emission spectroscopy, electrostatic probes and fast imaging to characterize the plasma environment and its interaction with various materials. It will be shown that a well-collimated plasma is created in the downstream region with a diameter of about 2 cm. High-energy electrons are observed along the axis of the discharge and the power deposition region is transferred to where the magnetic field maximum occurs in the downstream region. These findings indicate that efficient non-collisional heating occurs downstream of the plasma source.

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