

Abstract Submitted
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Characterization of Plasma Gun with TiH₂/C₆₀ Cartridge for Disruption Mitigation in Tokamaks¹ I.N. BOGATU, J.R. THOMPSON, S.A. GALKIN, J.S. KIM, FAR-TECH, Inc., HYPERV TECHNOLOGIES CORP. TEAM — Impurity injection for disruption mitigation in tokamaks must be faster than growth time of plasma instabilities, requires sufficient mass to get critical electron density, high penetrability, and large assimilation fraction in the core plasma, with rapid impurity redistribution over the whole plasma. FAR-TECH, Inc. proposed the innovative idea to use hyper-velocity (>30 km/s), high-density (>10²³ m⁻³) C₆₀/C plasma jets with high ram pressure to deliver the impurity mass in <1 ms. For this purpose C₆₀ powder explosively sublimated into molecular gas, from a solid state, pulsed power driven TiH₂/C₆₀ injector cartridge is ionized and accelerated in a plasma accelerator. We report the complete characterization of the TiH₂/C₆₀ cartridge with 5 kJ capacitive driver which demonstrated the capability of producing >30 mg of C₆₀ gas in <0.5 ms. In addition we present the construction and testing status of a 100 kJ coaxial plasma gun (~35 cm length) prototype with TiH₂/C₆₀ cartridge for a small scale, proof-of-principle experiment on a tokamak.

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Ioan-Niculae Bogatu
FAR-TECH, Inc.

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