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Rugged hydrogen sensor development for charge-exchange flux measurements on wall and divertor[1] RYAN HOOD, ROBERT KOLASINSKI, JOSH WHALEY, JONATHAN WATKINS, ALEC TALIN, Sandia National Laboratories — Characterizing the flux of charge-exchange neutrals to plasma facing surfaces in fusion devices is important to understanding wall erosion and redeposition. Palladium metal insulator semiconductor (Pd-MIS) Schottky diode sensors potentially offer a compact and inexpensive way to perform these crucial measurements. While previous Pd-MIS sensors have been tested in tokamaks, several issues prevented more widespread adoption. These sensors had a poor fabrication yield and were prone to degradation in the harsh fusion environment. This was thought to be due to high energy particles causing charge accumulation in the oxide layer, thereby distorting the measured signal. We report here on the fabrication and testing of sensors with an increased Pd layer thickness and minimized oxide thickness which are expected to mitigate these deficiencies. Titanium (Ti) and chrome (Cr) adhesion layers have been tested to prevent delamination of thick Pd layers. We report preliminary testing and calibration performed with a mass-separated 500 eV deuterium (D) ion beam with a total dose $>10^{14}$ D onto 1.5 mm diameter active area sensors. New sensors demonstrated improved fabrication yield and excellent sensitivity, serving as a pathway to future testing in a tokamak.

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