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Using Ion Implanted Depth Markers to Measure Erosion and/or Deposition in Fusion Relevant Materials[1] JUDE SAFO, REGINA SULLIVAN, DENNIS WHYTE, MIT Plasma Science and Fusion Center — A method for measuring the net erosion and deposition of high-Z materials at high temperatures ($>$ 1000 K) has been developed and tested. This was motivated by the success of a ^{7}Li depth marker at making similar measurements in low-Z materials at relatively low temperature ($<$ 600 K). At temperatures above 600K diffusion can cause the implanted low-Z depth marker to diffuse thus degrading the resolution and usefulness of this technique. Using high-Z depth markers greatly reduces this concern as these heavier species have much slower diffusion rates. Using Rutherford Backscattering Spectroscopy, (RBS), and/or Nuclear Reaction Analysis, (NRA), we can infer net erosion of the target. Preliminary analysis, using SIMNRA and SRIM identified ^{197}Au as an ideal candidate for the depth marker species. A simulated RBS trace of 2200 keV Au implanted in Molybdenum (Mo) shows a distinctive peak that is distinguishable from the RBS signal due to the Mo bulk. Experiments have been performed to determine the optimal method of implanting, optimal implantation time, and charge state. The goals of the experiment are, in order, to optimize the implantation and RBS characterization of the Au depth marker at room temperature (300K) then compare with results at elevated temperatures. Research supported by US Air Force ASOFR Grant FA9550-11-1-0195.

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