

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Hardening of Metallic Materials Using Plasma Immersion Ion Implantation (PIII)¹ YUFAN XU, MIKE CLARK, KEN FLANAGAN , JASON MILHONE, PAUL NONN, CARY FOREST , University of Wisconsin, Madison — A new approach of Plasma Immersion Ion Implantation (PIII) has been developed with the Plasma Couette Experiment Upgrade (PCX-U). The new approach efficiently reduces the duty cycle under the same average power for PIII. The experiment uses a Nitrogen plasma at a relatively high density of $10^{10} \sim 10^{11} \text{ cm}^{-3}$ with ion temperatures of $< 2 \text{ eV}$ and electron temperature of $5 \sim 10 \text{ eV}$. The pulser for this PIII experiment has a maximum negative bias greater than 20kV, with 60Hz frequency and a $8 \mu\text{s}$ on-time in one working cycle. The samples (Alloy Steel 9310) are analyzed by a Vicker Hardness Tester to study the hardness and X-ray Photoelectron Spectroscopy (XPS) to study implantation density and depth. Different magnetic fields are also applied on samples to reduce the energy loss and secondary emission. Higher efficiency of implantation is expected from this experiment and the results will be presented.

¹Hilldale Undergraduate/Faculty Research Fellowship of University of Wisconsin-Madison; Professor Cary Forests Kellett Mid-Career Faculty Award

Yufan Xu
Univ of Wisconsin, Madison

Date submitted: 14 Jul 2016

Electronic form version 1.4