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# Synchrotron Grazing Incidence X-ray Analysis of tungsten-based materials treated with high-fluence Plasma Immersion Ion Implantation (PIII) for fusion PFC studies

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Tungsten-based materials are the currently favoured choice for the first-wall/Plasma Facing Components (PFC) in plasma fusion devices such as the ITER tokamak. The behaviour of tungsten-based materials under high-fluence ion bombardment is therefore highly relevant for fusion device engineering problems. The USask Plasma Immersion Ion Implantation (PIII) system has been optimized for high-fluence ion bombardment candidate PFC materials. PIII can be used to simulate the high fluence ion bombardment encountered in plasma fusion devices, and therefore provides a useful tool for PFC testing. This talk will discuss a recent study of tungsten-based materials (pure tungsten, W-Ni-Cu heavy alloy, and W-Ta) PIII-implanted with helium and deuterium. The post-implant analysis of these materials was carried out using synchrotron-based Grazing-Incidence X-ray Diffraction (GIXRD) and Grazing-Incidence X-ray Reflection (GIXRR) at the Canadian Light Source. These data reveal important aspects of the effect of helium and deuterium ion bombardment of tungsten-based PFC materials, and shed light on their suitability for fusion devices.

## Keyword-1

PIIII

## Keyword-2

GIXRD

## Keyword-3

GIXRR

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