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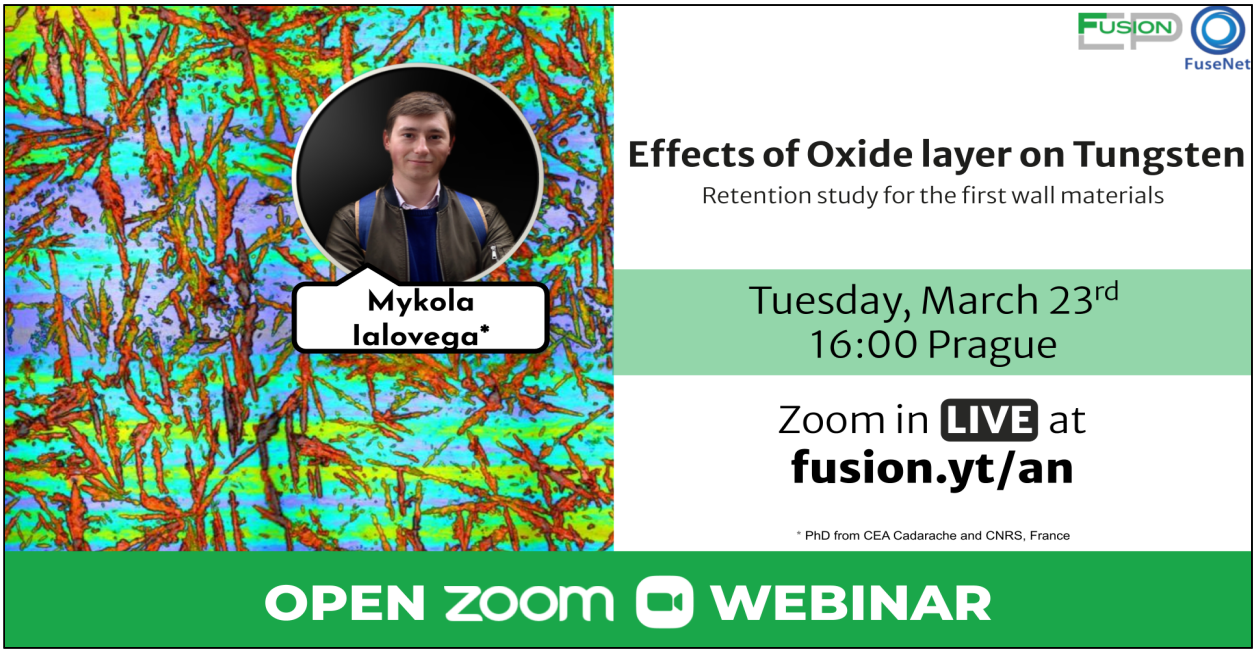

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Title: Effects of Oxide layer on Tungsten

Speaker: Mykola Ialovega

When: 2021-03-23 16:00:00

Abstract: Investigations of hydrogen isotopes and helium retention in plasma facing components (PFC) that are exposed to various plasma conditions are important for future fusion devices such as ITER and DEMO. Due to its favorable physical properties, in particular its high melting point, tungsten (W) has been chosen as the plasma-facing material of the ITER divetor. In the deuterium/tritium (D/T) phase of ITER, W PFC will be subjected to intense fluxes composed of hydrogen isotopes (HI), helium, impurities and neutrons.The presence of impurities in the edge plasma may cause redeposition or codeposition of mixed layers on the surface of the PFC W, and in the presence of residual oxygen, surface oxidation is possible due to the high temperature of the ITER divertor. Such structural modifications of W PFC may modify the properties of the material, and therefore its life expectancy, as well as its hydrogen retention, which raises safety concerns as tritium is radioactive.In this work, we used laboratory experiments involving ion implantation and thermal desorption spectrometry (TDS) technique to investigate the fundamental retention properties of HI in W PFC due to the presence of an oxide layer formed on the surface of polycrystalline W (PCW) in ITER relevant conditions. The TDS measurements were coupled with microscopy observations in order to characterize the modifications occurring on the surface and in the bulk of the material at different scales: scanning electron and confocal laser scanning microscopy techniques were used for surface observations from micrometer to nanometer scale; transmission electron microscopy was used for cross-sectional observations. Raman and X-ray spectroscopy techniques were used to characterize the structure and chemical composition of the samples.

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