Contribution ID: **178** Type: **not specified**

Analysis of inner divertor materials of JET C-wall and ILW from viewpoint of spectrometric investigations

Monday, 17 September 2018 11:00 (2 hours)

Installation of metallic plasma facing wall (ITER-like wall – ILW) [1] and replacing the previous carbon wall (JET-C) in the Joint European torus (JET) was a unique possibility to collect from the tokamak vacuum vessel the first wall erosion products (EP) – dust and flakes.
Fundamental investment about the properties of EP to comply with security reasons is given by analysing EP from other tokamak devices. Carbon based materials are considered as plasma facing materials in stellarators. A comparison between tritium release and chemical composition of plasma exposed materials will allow to expand the knowledge about materials behaviour in fusion devices.
Temperature programmed tritium thermodesorption results show to differences between ILW and C-wall plasma facing surface samples. Tritium release from a sample, cut from ILW inner divertor vertical tile, is in range 470-870 K. From analogous position from JET-C wall tritium releases 450-1180 K, while from EP: 370-1140 [2].
Selected EP were investigated with means of energy dispersion X-ray (EDX), infrared, electron spin resonance and Raman spectrometry.
EDX analysis of EP shows presence of metallic impurities (Fe, Ni, W etc.) and carbon as main component. With electron spin resonance spectrometry two types of paramagnetic centres - g=2.002 and g=2.12, are characterized. Raman spectra allowed to estimate that in EP are graphite nano-crystals with size ~15 nm. Infrared spectra show presence of inorganic oxides. The obtained results supplement the information about composition of the EP from fusion devices.

1.M.Rubel et al./Nuclear Fusion 57 (2017) 066027
2.L.Avotina et al./Advanced Materials and Technologies, Palanga, Lithuania, 2015, 144, P125

This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programme 2014-2018 under grant agreement No 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission.

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Session Classification: P1

Track Classification: Plasma Facing Components