Fabrication of nanostructured coatings for energy applications

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Energy production and the combat against climate change are at the centre of our daily concerns and stand for a socioeconomic priority. Nowadays, great efforts are being made to develop different ways of providing clean energy sources to supply our increasing energy demand abating provisions of fossil fuels.

In this work, we are going to focus on the fabrication of nanostructured coatings and its capabilities to contribute to develop "clean" energy sources. Firstly, we are going to present the power of the sputtering technique to fabricate nanostructured coatings with the desired morphology in large area. We are going to show the influence of the sputtering parameters such as working gas pressure, distance between the target and the substrate, substrate temperature, voltage applied to the cathode, angle of incidence of the particle flux and sputtering configuration (DC, HiPIMS) on the morphology of the produce coatings. Then, by combining experimental and multiscale simulations (Density Functional Theory Object Kinetic Monte Carlo and Molecular Dynamics) results, we are going to discuss the capabilities and limitations of nanostructured W to be used as plasma facing material in nuclear fusion reactors, highlighting the role of nanostructurization in the light species (H) behavior [1-5].

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