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Hydrogen adsorption on and diffusion across the (110) surface of tungsten with oxygen. Hydrogen solubility at the tungsten-copper interface.

Wednesday, February 22, 2023 10:10 AM (20 minutes)

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The presentation will summarize our recent achievement in the frame of this IAEA Coordinated Research Project on the Hydrogen Permeation in Nuclear Materials.

Our project contained three different tasks related to (i) beryllium and the recombination of SIA with VHj vacancies, (ii) hydrogen adsorption and diffusion across the W(110) surface with oxygen, and (iii) hydrogen solubility and diffusion properties at the interface.

Task (i) related to beryllium is over since last year. Task (ii) is just completed, and I will summarize the result we get on hydrogen adsorption and diffusion on the (110) surface of tungsten with pre-adsorbed oxygen atoms. The main results are that oxygen decreases the number of available sites for hydrogen on the surface, and that it also decreases the binding energy of hydrogen to the W(110) surface. Regarding the diffusion properties, an over-saturation effect is observed as on the clean surface, which dramatically decreases the activation barrier for recombination into molecular hydrogen and absorption into the bulk once the surface is fully saturated in adsorbate.
Finally, we are working at task (iii) related to the W/Cu interface. We have now calculated the full energetics of hydrogen close and at the interface of the model we built, and can conclude that the interface we built acts as a sink for hydrogen and should lead to tritium accumulation at the interface.

In the end, a brief summary of the work we intend to do in the one or two coming years will be provided.

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