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Novel Method for Determination of Tritium Depth Profiles in Metallic Samples

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Novel method for determining the depth profile of tritium in metallic samples has been demonstrated. Tritium accumulation in the fusion reactor materials is considered as a radiological issue due to its radioactivity. Therefore, tritium behavior prediction and estimation of its overall retention in fusion devices is of high importance.
Proposed method in this study allows to measure depth profile of tritium in the metallic samples after exposure to tritium containing plasma, tritium gas or after irradiation with neutrons resulting in the tritium formation.
In the method, successive layers of metal are removed using appropriate etching agent in the controlled regime and amount of evolved gases measured by the means of chromatography (gas composition and release rate) and proportional gas flow detector (tritium). Results on tritium profile in neutron irradiated, plasma exposed and tritium gas loaded beryllium have already been reported. Possible applications of the method for other metallic samples have been tested within this research.

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