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Platinum supported on graphene - PTFE as catalysts for isotopic exchange in a detritiation plant. Manufacturing and physical and microstructural analysis

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The catalytic separation of hydrogen isotopes is of particular interest for nuclear industry from the point of view of tritium recovery and its use in fusion reactors. Isotopic exchange may take place in the homogeneous (gaseous) phase or in the heterogeneous phase (hydrogen or gaseous deuterium and water or liquid heavy water). Catalysts are necessary both for the homogeneous phase reaction and the heterogeneous reaction.

Recently, graphene and graphene oxides have been investigated as support material due to their excellent physical and chemical properties. The high specific surface, their thermal and chemical stability, high mechanical strength make graphene a potential component in the development of new catalysts that could be used in isotopic exchange. The use of graphene and graphene oxides as support for the active metal has shown an improvement in catalytic activity when compared to the conventional support, degasolination carbon. This behaviour may be explained by the high dispersion of active metal on the surface of graphene.

The paper presents the preparation of some catalysts that will be used in the future catalytic isotopic exchange experiments (in the beginning VPCS in order to understand its efficiency in isotopic exchange then the catalysts will be integrated into a LPCE-type laboratory installation). The catalysts thus prepared will be characterised from the microstructural point of view for a comparison with existing catalysts. BET, SEM, TGA and XRD will be used for the physical and microstructural analysis of catalysts.

Co-author: VASUT, Felicia (National Research and Development Institute for Cryogenic and isotopic Technologies - ICSI Rm. Valcea)

Presenter: VASUT, Felicia (National Research and Development Institute for Cryogenic and isotopic Technologies - ICSI Rm. Valcea)

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