

## BEHAVIOUR OF FLUOROPOLYMERS IN PRESENCE OF TRITIATED WATER

**Gh. Bubueanu, C. Postolache and C. Tuta**

"Horia Hulubei" National Institute of Physics and Nuclear Engineering (IFIN-HH),  
Atomistilor street, 407, 077125, Magurele Ilfov, Romania

One of the most used methods for tritium recovery from tritiated water relies on combined electrolysis with catalytic isotope exchange techniques. The electrolytic cell converts the tritiated water or tritiated heavy water into a hydrogen, deuterium and tritium mixture. The mixture is purified and then tritium is recovered by catalytic isotopic separation techniques.

Tritium presence in the system induces an intense radiation field especially at aqueous solution interface. This can generate significant structural modifications with potentially negative effects. In this paper work it is followed the study of radiolytic phenomena in Pt/C/PTFE isotopic exchange catalyst, NAFION membranes and VITON fluoroelastomer in presence of tritiated water with high radioactive concentration.

Radiolytical processes were analyzed by:

- Exposure of fluoropolymers samples immersed in H<sub>2</sub>O at gamma radiation field (60-Co source) in vacuum, at liq. Nitrogen temperature and at ambient temperature respectively.

- Immersing of NAFION, Pt/C/PTFE catalyst and VITON samples in tritiated water with high activity (3.7 and 37 TBq/L) for different time period.

In both cases the samples were characterized by FT IR ATR, and fluoride ions emission from polymeric matrix.

Experimental results were correlated with quantum-chemical simulations.