

## **Collapse of mesoporous silicas induced by radiation damage – Comparison of external and internal irradiation**

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Considering their large interfacial surface, nanoporous materials offer interesting perspectives for the study of the evolution of damage induced by irradiation [1]. In order to study this phenomenon, thin films and powders of mesoporous silica (SBA15, MCM41) produced by sol-gel process were respectively irradiated with ions (Au, Xe...) and electrons (0.5 - 2 MeV). In all cases, significant compaction of the porous network was observed, inducing a collapse of the mesoporosity [2-3]. More recently SBA15 samples were doped with plutonium 238. The collapse of the mesoporous structure induced by the recoil nucleus of  $^{238}\text{Pu}$  alpha decay seems less than that observed following external irradiation. The presentation aims to discuss the observed differences.

From a technological point of view, the observed effects could be used for the encapsulation of radionuclides in mesoporous materials (silicas) which opens new perspectives for the treatment of radioactive effluents.

[1] P. Makowski, X. Deschanel, A. Grandjean, D. Meyer, G. Toquer and F. Goettmann, *New J. Chem.*, 36 (2012) 531.

[2] Y. Lou, S. Dourdain, C. Rey, Y. Serruys, D. Siméone, N. Mollard, X. Deschanel, *Micropor. Mesopor. Mater.*, 251 (2017) 146.

[3] J. Lin, G. Toquer, C. Grygiel, S. Dourdain, Y. Guari, C. Rey, J. Causse, X. Deschanel, « Behavior of mesoporous silica under 2 MeV electron beam irradiation » *Microporous Mesoporous Mater.* 328 (2021) 111454.