



Institut de Minéralogie et de Physique des Milieux Condensés  
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# SÉMINAIRE

## Mardi 10 avril, 14h30

*Salle de Conférence, 4ème étage, Tour 22-23, Salle 1  
IMPMC, Université P. et M. Curie, 4, Place Jussieu, 75005 Paris*

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# NMR STUDIES OF NUCLEAR WASTE MATERIALS: CUTTING THROUGH COMPOSITIONAL AND MORPHOLOGICAL COMPLEXITY

Multinuclear magnetic resonance spectroscopy is used to identify and quantify devitrification products in heterogeneous model nuclear waste materials containing up to 19 oxide components. These complex phase assemblages contain mixed-alkali compounds and substitutionally disordered chromate/molybdates. The presence of paramagnetic ions complicates the NMR analysis but also provides valuable information about the partitioning of species amongst phases. Hydration reactions appear to play a critical role in the formation of some precipitates which may impact the long-term chemical durability of these materials. Circumventing the formation of such phases requires knowledge of the high-temperature behaviour of the melt and the formation mechanisms during cooling. High-temperature magic-angle spinning NMR is used to characterize phase transformations and reactions amongst devitrification products during cooling, under conditions mimicking those of industrial processes and long-term storage.