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NMR Methods for Study of Waste Glasses

11B MAS NMR methods for analysis of borosilicate glasses for storage of high-level waste.

Summary

As part of a wider project looking at the use of borosilicate glasses as a high-level nuclear waste form undertaken by a group of four universities in the UK and USA, MAS NMR has been used at The University of Warwick as a tool for investigating structure and speciation in these glasses. This study was motivated by recent findings that waste loading rate could be greatly increased from 18 to 45 %mass by targeting certain phases.

Multiple fields were used to assist in producing accurate simulations of the quadrupolar parameters of the nuclear sites, as well a software package that allows for the inclusion of disorder in these parameters. Low field 11B MAS NMR (2.3 T) was also found to be a very promising tool for the analysis of these glasses, with the broadened lineshapes making the separate features more distinct.

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Track Classification: Novel techniques in waste-form development (including glass, ceramic, metallic, and composite waste forms)