

Synthesis by SPS of new glass matrix composite with functional properties - toward self-healing glass

Julien MORICEAU¹, Patrick HOUIZOT¹, Laurent CALVEZ², Mathieu PASTUREL², Tanguy ROUXEL¹

¹ Institut de Physique de Rennes UMR UR1-CNRS 6251, Département Mécanique et Verres, Bât. 10B, Université de Rennes 1, Campus de Beaulieu, 35042 Rennes cedex.

² Institut des Sciences Chimiques de Rennes, UMR UR1-CNRS 6226, Bât. 10A/B, Université de Rennes 1, Campus de Beaulieu, 35042 Rennes cedex.

Dense glass matrix particulate composites containing 2 %_v of magnetic Fe₃O₄ particles, 70 nm size in average, were synthesized by means of Spark Plasma Sintering (SPS). We show in this study that a temperature as high as 330°C can be induced in the composite by applying an alternating magnetic field for a few minutes. This finding opens new possibilities for crack-healing and health recovery in damaged glassy materials. The elaboration, the magnetic, and the mechanical properties of this novel functional glass-based composite are presented.