SYNTHESIS OF GEOPOLYMER EMULSIONS

Arnaud Poulesquen, CEA, DEN, DE2D, SEAD, LCBC, F-30207 Bagnols sur Cèze, France
arnaud.poulesquen@cea.fr
Angélique Barneoud-Chapelier, CEA, DEN, DE2D, SEAD, LCBC, F-30207 Bagnols sur Cèze, France
Jérémy Causse, ICSM, LNER, F-30207 Bagnols sur Cèze, France

Key Words: geopolymer, emulsion, monolith, hierarchical porous network

The understanding of emulsion geopolymer synthesis is a major issue for several industrial applications such as the formation of hierarchically porous material for filtration, lightweight materials for civil engineering or even the conditioning of radioactive mineral oil. Emulsion stability (irreversible coarsening, creaming…) are mainly controlled by the interfacial properties (surface tension and nature of the surfactant) and the viscosity ratio between the dispersed (η_d) and the continuous phase (η_c). The aim of this paper is thus to study model emulsions (composed of hexadecane (C16) as dispersed phase and metakaolin based geopolymer as continuous phase) with the highest volume fraction of C16 as possible. Surfactant was added to the mixture to stabilize the C16 droplets and geopolymer emulsion was synthesis under shear stirring. The influence of the viscosity of the geopolymer paste controlled by the water content was studied and results show that emulsions are unstable for a viscosity ratio η_d/η_c lower than 0.01. Up to 70% in volume of C16 was incorporated within the geopolymer and hierarchical porous network was thus obtained. Indeed, after removal the C16 phase, the porous network was characterized and a specific surface area of 90 m²/g, a mean mesopore diameter of 19 nm, a macropore size distribution ranged between 10-200 µm (fig 1.) and a compression strength of around 0.5 MPa were obtained.

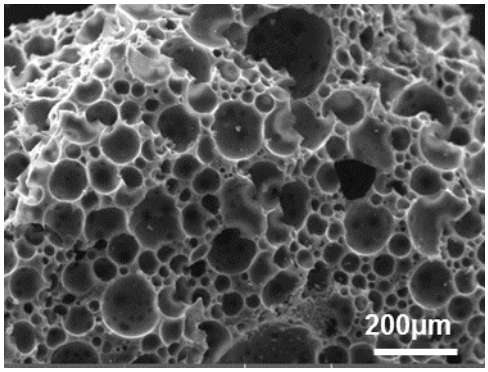

Figure 1 : SEM image for geopolymer emulsion with 70% v/v of C16