



# BOOK OF ABSTRACTS

13<sup>th</sup> Conference of the European Ceramic Society

ECERS XIII, Limoges, France

June 23 - 27, 2013



**Presentation type:** Poster

**Reference:** A-155 - Session 1

### Wood, earth and geopolymer building systems

*Authors: F. Gouny, S. Rossignol (CEC-ENSCI-GEMH, Limoges), F. Fouchal, O. Pop (GEMH-GCD, Egletons), P. Maillard (CTMNC, Limoges)*

**Presenting author:** Fabrice GOUNY  
CEC-ENSCI-GEMH, Limoges, FRANCE  
fabrice.gouny@etu.unilim.fr

#### Abstract

Currently, awareness of environmental aspects has grown in the building construction area particularly in the development of new environmentally friendly material. The association of construction materials such as wood and earth already use for several millennia all over the world seems to be relevant. This study is focus on building with load-bearing timber frame with industrially extruded bricks as filling. The problem of such structures (wood and earth) is cracks which can occur along the year at the interface between earth bricks and wood frame. This can lead to a decrease in thermal efficiency of the building and obviously to aesthetic problem. Wood and unstabilised earth bricks are both hygroscopic materials and show a different behaviour with temperature and moisture variation. A material must be used at the interface in order to compensate swelling-shrinkage phenomena due to temperature and humidity fluctuation. Geomaterial binder appears as a good candidate to be used at their interface.

On the first hand, a geopolymer mortar has been developed to improve the workability of the binder. Different aggregates have been used, compression tested have been realized. On the other hand, laboratories assemblies of wood and earth brick with geopolymer binder have been made for mechanical shear tests and structural observation. Moreover shear behavior of assemblies has been investigated by digital image correlation to better locate crack during loading. Two different compositions (different amount of clay particle) of bricks were used for tests. Finally full scale wall has been built to characterize the hygrothermal properties in a climatic simulation chamber.

Results show that geomaterial binder has a good ability to stick on wood and earth bricks. A part of the binder is absorbed by wood and earth before the strengthening of the sample. The mortar obtained has an improved compressive strength, ranging from 3 to 8 MPa. Moreover the nature of the brick has an influence on mechanical properties, the earth brick seems to be the limiting parameter.