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Preface

Geopolymers: a new and smart way for a sustainable development

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"Geopolymers" is a general term that describes a wide variety of inorganic and composite materials with limited restrictions on alumina and silica content. In the last decades, they have been also defined as "low-temperature aluminosilicate glasses", "hydroceramics", "inorganic polymer concrete" or "alkali bonded ceramics". Recently, an updated definition has been proposed by the RILEM Technical Committee 224-AAM: "geopolymer materials are essential aluminosilicates activated with alkaline solution, excluding any other alkali-activated materials that should be classified apart" [1].

Geopolymers are attractive from several perspectives: cost (near-net-shape pieces may be produced at low temperature), avoidance of temperature gradients (thermal stress), dimensional stability over a wide range of temperature, possibility of *in-situ* production, and tailoring of the properties by introducing fillers, pigments, macromolecules, etc. to produce composite materials. Moreover, geopolymers have been developed following the principles of green chemistry, since they are synthesized from a wide variety of materials, including recycled resources and mineral wastes, reducing the energy demand and environmental impact during their production. For these reasons, geopolymerization or alkali activation may be considered an environmentally friendly and sustainable consolidation technique for years to come to treat aluminosilicate-based wastes, tailings and residues.

Geopolymer technology produces a wide range of versatile materials already applied in many fields: automotive and aerospace, non-ferrous foundry and metallurgy, buildings and constructions, waste management, retrofitting, cultural heritage and so on.

The aim of the Special Issue "**Geopolymers: a new and smart way for a sustainable development**" is to present an updated "state-of-the-art" collection of original papers ranging from the base science to application-driven researches. Since geopolymers mimic clay minerals in terms of final structure and properties, the special issue contains not only papers on clay-based geopolymers, but also on materials produced from recycled aluminosilicates, assessing that: "*Geopolymers are the logical consequence of the green chemistry, which operates for a sustainable development*".

The first part of the Issue is dedicated to basic studies of metakaolin-based model systems with the aim to define their micro- and nano-structures. Passing through the study of the processing of raw materials or the geopolymer consolidation stage, readers are accompanied to the evaluation of the properties; this latter part of the Issue appears particularly appealing because it is application-driven. Finally, several formulations of geopolymers deriving from industrial wastes are presented.

The editors believe that the satisfaction of the readers is the best recognition to the efforts and time devoted to this Special Issue.

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Reference

[1] http://www.rilem.net/tcDetails.php?tc=224-AAM.

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