

ABSTRACT - ORAL

Methodological approach for developing a refractory ink suitable for 3D printing technology

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Thanks to its high versatility, additive manufacturing is used in many fields such as powder metallurgy, polymers, ceramics and recently in the field of civil engineering.

In the field of refractories, this shaping approach, based mainly on material extrusion, has not yet been adopted whereas it has a significant potential. Indeed, it offers the possibility of producing parts with complex geometries which are difficult to achieve by conventional techniques while avoiding the use of formworks/moulds whose costs from a few hundred to several thousand euros. In addition, a reduction in production costs, environmental and societal impacts can be considered via the reduction of labour and waste, controlled consumption of raw materials via the topological optimisation of parts as well as the reduction of risks on site.

To allow the emergence of this approach in this field, key scientific barriers have to be overcome, especially in the formulation, implementation, and characterisation of these materials. This is the purpose of this current study by developing a printable formulation of an alumina based refractory castable. This tailored formulation must have pumpability, extrudability and buildability properties, mandatory for the printability characteristics of such materials. The parts produced by material extrusion will be characterised in terms of thermomechanical performance after printing and firing at high temperature.