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Development of self-draining ceramic with residue from the production of iron ore

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Kay-words: Ceramic coating, experiment designer, Mineral Residue, draining ceramic

ABSTRACT

The need for drainage of rainwater is a demand of the process of urbanization in which the self-draining floors can contribute decisively to mitigate risks of floods and contribute to aesthetics of the cities. For this, a self-draining red ceramic floor with a high aesthetic standard and satisfactory drainage capacity was developed. Such ceramic should be able to meet the demands of paving of residential and/or public areas. To prepare the ceramic mass, 3 factor response surface experiment planning, common clay (40-93%), mineral residue (5-58%) and expansive element (1-2%) were used. The expansive element was produced by the bonding of metallic aluminum powder and cement, in proportions ranging from 50 to 10% cement. The optimization of the ceramic mass used simplex numerical modeling with pseudo-value attributes to determine the most convenient formulation. The ceramic mass was thermally treated at 800 and 1110°C and characterized by XRF, XRD, flexural strength, water absorption, apparent porosity and permeability. Preliminary results indicate that it is possible to produce a ceramic with good aesthetic quality of sharp red staining and resistance to bending compatible use in traffic areas. The permeability must be optimized in order to allow a greater drainage, however, it was verified that the drainage capacity is approximately 30% greater than the control ceramics.