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Assessment on WASTE
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SEMINAR ANNOUNCEMENT

White Room (Aula Bianca), Building 21, 6th floor
Department of Civil and Environmental Engineering
19th October 2018 – 11:30-13:00

Copper tailing as a supplementary cementitious material

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Abstract

The use of tailings as aggregate and supplementary cementitious materials (SCM) has been studied, but tailings are generally used as collected, without treatment, showing low cementitious capacity and therefore low replacement levels (below 15% of cement). The purpose of this research was study eight copper tailings collected in different parts of Chile to determine which tailings are likely to improve their cementitious capacity as SCM by using thermal and mechanical treatments. It was observed that due to the nature of rock processing prior to mineral extraction, the particle size was able to be reduced by 50% after 60 min of milling or less. A central composite design was proposed using thermal treatment temperatures between 600°C and 800°C (central point at 700°C) and milling with a central point at 30 min. The results show that the mechanical performance of the mixtures can be improved by up to 40% at 90 days compared to untreated tailings at a 40% replacement level. The purpose of this research was to evaluate, from a mechanical performance perspective, the use of treated tailings as SCM. The same project also evaluates the use of other SCMs like Sewage Sludge Ash (SSA) and the optimization of the thermal treatment to improve their cementitious capacity. The use of tailings as aggregates has been also studied during the research process, as replacement of fine aggregate and through geopolymerization processes.



Bio-sketch

Mr. Felipe Vargas, PE, BE, currently pursuing a PhD degree at the Department of Management and Construction Engineering, at the School of Engineering, Pontificia Universidad Catolica, Santiago, Chile. His research activities are related with the use, chemical characterization and performance of Supplementary Cementitious Materials (SCM), geopolymerization of raw and waste materials and new methodologies for concrete and pastes tests. He is interested in conducting research through life-cycle assessment (LCA) and by-products from the mining industry and the use of by-products in low mechanical performance cementitious mixes.