**Innovative glass recipes containing industrial waste materials**

**Abstract:**

The growth of the industrial production brings a high volume of waste materials as a consequence. These products have a significant impact on the environment. Therefore, the valorisation of industrial wastes, especially those produced in huge quantities, is an important social and ecological question. The waste reuse and recycling could afford the development of new products and aggregate value to materials that previously would be discarded. Furthermore, it could reduce the consumption of natural resources and the environmental pollution.

Blast furnace slag and fly ash are waste materials largely used in the concrete production, mainly as an aggregate, and road construction, as porous asphalt and as others. These wastes contain many elements which are also present in typical glass formulas, for instance CaO, SiO2, Al2O3 and Fe2O3. However, these elements are high refractory and their presence in complex compositions leads to a high tendency to crystallization and high working temperatures. For this reason, it is a challenge to get transparent materials in reasonable temperatures from these waste products. The glass is a material that allows large amounts of various elements in solution, being suitable to assimilate the complex materials in its compositions. In this work, we got transparent glass samples incorporating amounts up to 35% (in weight) of blast furnace slag or fly ash. The compositions were adjusted in order to allow chemically durable glasses in relatively low melting temperature: the samples were successfully submitted to water durability tests and were obtained in melting temperatures between 1100°C and 1400°C, depending of the composition. The melting conditions were optimized in order to allow a higher transparency. The optical, mechanical and thermal properties of the samples were measured and compared to the standard borosilicate and soda-lime glasses. The potential application of these new compositions as building materials was evaluated.