## Geopolymerization as Cold-consolidation Techniques for Hazardous and Non-hazardous Wastes

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Many interesting studies on the utilization of wastes produced in different human activities (urban, agricultural and industrial) have been carried out with the goals to reduce, to recycle, to reuse or to recovery: the R4 strategy. Many of these waste contains high amount of silicoaluminates, making them suitable for alkali activation to become one of the most promising binders for the future. Other type of wastes, even if hazardous, such as incinerator fly ash, electric arc furnace dust, lead smelting slag, etc. can be easily added to the use geopolymer matrix for the immobilization of either cations or anoions or both. With the term "geopolymers" it is commonly defined an inorganic 3D polymer obtained by the alkali activation of aluminosilicate (SiO2 and Al2O3 >80 wt%)powders. These materials are generally X-ray amorphous gels in which the silicate and aluminate units, generated during the first step of alkali activation, occur in a highly connected three dimensional tetrahedral framework after the polycondensation process. So finally, they can be considered solids where the cations remain mainly associated with aluminate moieties to compensate, similarly to zeolites, the negative charge arising from the tetrahedral aluminium, Al+3. It has been proved that also anions can be entrapped in these aluminosilicate matrices, ofter described as nanozeolites. The leachability tests have been used to confirm the inertization while FT-IR and NMR describe the complex microstructures of th consolidated materials.

The presentation will provide a fundamental contribute for: i) a better knowledge of chemical-physical-mechanical performances of the investigated geopolymers; ii) the development of new products ready to be introduced into the market because produced with a low cost existing technology.