ENERGETICS

ENI - Characterization of irradiated molten salts for fusion applications

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Context of the research activity	In the context of energy framework, and to face the climate changes, new energy sources must be pursued. In this framework, fusion power plants can represent a way to support the energy market. A new generation of compact fusion reactors is under investigation by scientific community. In particular, the design of Affordable Robust Compact (ARC) reactor, proposed by MIT (Massachusetts Institute of Technology) and PSFC (Plasma Science and Fusion Center) scientists, represents a promising concept.
Objectives	To "demonstrate" nuclear fusion it is necessary to build an experimental reactor. The new generation of fusion reactors is evaluating the use of molten salt, FLiBe, as breeder and coolant. The aim of this PhD work is to qualify FLiBe, investigating the following aspects: 1. Identification of minimum requirements in terms of corrosivity, induced radioactivity, interaction with tritium, in the plant life; 2. Effect of impurities on FLiBe behaviour; 3. Evaluation of molten salt under neutron irradiation; 4. Material compatibility; 5. Characterization in terms of supply chain; 6. Definition of methodologies to analyse and monitor the molten salt. During the PhD activity, the involvement in experimental campaigns is expected both in the ENI laboratories and in the PSFC-MIT facilities.
Skills and competencies for the development of the activity	Nuclear engineering; Safety of Nuclear Power Plants; Fusion Technology. Molten salts knowledge for fusion applications.