**IIIj23-001**

**Processing of zirconium sponge and zirconium alloys in an electric arc furnace**

Reis, L.A.M.(1); Pereira, L.T.(1); Politano, R.(1); Barbosa, L.P.(1); Martinez, L.G.(1); Mucsi, C.S.(1); Rossi, J.L.(2); Betini, E.G.(1); Morais, N.W.S.(3);
(1) IPEN; (2) IPEN-CNEN/SP; (3) IPEN - CNEN/SP;

Zirconium and its alloys, as well as titanium and its alloys, are mostly used in the nuclear and aeronautical industries, respectively. A nuclear-grade zirconium sponge is the main component for obtaining nuclear fuel element cladding for nuclear power plants and other components, such as grids and springs. The zirconium sponge is also an important raw material in obtaining various alloys for nuclear fuels from small and medium power reactors, such as U-Zr-Nb. Thus, this project has relevance, since the clean melting of zirconium sponge will provide part of the domain of nuclear fuel technology. In this work, high entropy alloys (Ti-Zr-Nb-Ta-Fe-Cr) were produced in order to evaluate the evolution of the microstructure and modulus of elasticity as a function of temperature and heat treatment. A high entropy alloy with a composition different from those found in the literature is proposed. The materials were separated and melted in an electric arc furnace under a non-consumable electrode vacuum. These alloys were consolidated in the form of bars 220 mm long and thicknesses ranging from 8 to 12 mm. After melting, annealing was carried out at 1100 °C for 24 hours to homogenize the material obtained. The initial microstructural analyzes showed two very distinct phases with defined grain boundaries, the chemical etching to reveal the microstructure was a solution of 100 ml deionized H2O + 10 ml HNO3 + 2 ml HF. The samples are being quenched in oil and X-ray diffraction tests will be carried out in a hot chamber and the results will be presented at this congress.