Contribution ID: **216** Contribution code: **THU-PO3-205-08** Type: **Poster**

Heat Treatment Optimization on Nb3Sn Strands Based on Electrical and Physical Properties

Thursday, 18 November 2021 10:00 (20 minutes)

The electrical and physical properties of Nb_3Sn strands are strongly dependent on the heat treatment during which tin diffuses into niobium by solid-state diffusion. During diffusion, Nb_3Sn grains grow at the Nb/bronze interface. The shape and size of the grain depend on the temperature of the last step of the heat treatment, its duration and the size of the Nb filaments. The volume of reacted Nb_3Sn together with the grains'structure influence the non-copper critical current density j_c and the magnetization. Therefore, an optimization of the heat treatment with respect to j_c and hysteresis loss is important when working on the design of superconducting cables. This contribution presents the results of a heat treatment optimization performed on a 1mm diameter, internal Sn Nb_3Sn strands produced by KAT (Korea) for a 66 kA / 12 T prototype React&Wind conductor for the Toroidal Field Coil of EUROfusion DEMO. The heat treatments and the j_c measurements on ITER barrels were performed at SPC (Villigen, Switzerland) at 4.2 K, in the range of 9 T to 15 T, the SEM micrographic studies on grain size and shape were conducted at CERN and the hysteresis loss was measured on a vibrating sample magnetometer (VSM) at ENEA (Frascati, Italy). Eventually, a heat treatment schedule is proposed for the prototype DEMO conductor and the scaling law for j_c is updated.

Primary author: DEMATTE, Federica (EPFL-SPC)

Co-authors: BRUZZONE, Pierluigi (EPFL-SPC); SARASOLA, Xabier (EPFL-SPC); DE MARZI, Gianluca (ENEA); MUZZI, Luigi (ENEA); RODRIGUEZ CASTRO, Enrique (CERN); SGOBBA, Stefano (CERN)

Presenter: DEMATTE, Federica (EPFL-SPC)

Session Classification: THU-PO3-205 Fusion V: Toward DEMO