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Nb3Sn on Cu thin film SRF cavities for new generation LINACS operating at 4.5 K

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Energy saving is mandatory for new generation linacs and accelerators more generally. Cryogenics is one of the major energy costs in modern SRF accelerators because of the need to lower the operating temperature to 2K. Substituting Nb with a higher critical-temperature superconductor, such as Nb3Sn, allows operations to be moved up to 4.5 K with a reduction in cryogenic costs by a factor of 3. On I.FAST collaboration R&D activity cover all the cavity production chain with the goal of producing the first prototype of a Nb3Sn on Cu 1.3 GHz elliptical cavity. This work will show the results obtained at INFN LNL with Plasma Electrolytic Polishing for substrate preparation and the solutions adopted to optimize Nb3Sn coatings via DCMS. First RF measurements on planar quadrupole resonator will also be shown and finally the scalability from small flat samples to elliptical cavity prototype will be also discussed in the conclusions.

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