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Magnetron sputtered Nb3Sn and V3Si thin films on copper substrates for SRF application

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In this contribution, we explore the growth of thin superconducting (SC) films, such as Nb3Sn and V3Si, on copper as possible candidates for the reduction of the operational surface resistance of superconducting radio-frequency (SRF) coated cavities for particle accelerators.

For an optimal SRF performance, the SC layers, grown using magnetron sputtering, have to be free of any contamination and as dense as possible. We will show that while for Nb3Sn a barrier layer of Ta is required in order to avoid any Cu intermixing into the superconducting layer, no barrier layer seems to be required for the growth of V3Si. The latter would be great interest for scale up purpose in order to minimize the number or sputtering targets to be used in a real cavity.

For Nb3Sn, the attempts to densify the coatings using high power pulsed magnetron sputtering will be discussed. For the V3Si/Cu system, the different approaches to the growth protocol will be exposed and proofs of the achieved superconductivity in these layers will be shown.

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