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Niobium-tin films grown on copper by low-temperature co-sputtering for SRF cavity application

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In this contribution the low-temperature synthesis of Nb₃Sn, a promising material for superconducting radio frequency (SRF) application is presented. Theoretically Nb₃Sn is superior to Nb in surface resistivity, critical temperature and critical field, but in practice the performance is lacking behind due to early quenching at low fields. Co-sputtering at low sample temperature could overcome the microstructure-related limitations due to the high kinetic energy of the sputtered particles.

We show by X-ray photoelectron spectroscopy that copper diffusion during low-temperature growth is limited to an interface region of about 100 nm. Furthermore, we show that the deposition time has a critical influence on phase formation. The deposited Nb₃Sn films have low surface roughness, high scratch resistance and they show excellent adhesion before and after thermal cycling.

Footnotes

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