

Texas Center for Superconductivity at the University of Houston Colloquium

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IBAD-Textured Coated Conductors

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Room: 214, University of Houston Science Center

11:00 a.m. 12:00 N

- *Seating is limited. RSVP to ext: 38210.*

Abstract

Second generation high temperature superconducting (HTS) wire, also known as coated conductor, holds great promise, thanks to its relatively low cost and high superconducting critical currents, to enable a number of superconducting power applications. In this talk we review some of the progress on ion-beam assisted deposition (IBAD) textured coated conductors. At Los Alamos National Laboratory we have developed processes for continuous texturing of MgO on metal tapes, buffer layer depositions, and HTS deposition by laser ablation and reactive coevaporation. IBAD-MgO texturing is the enabling process for these coated conductors. It is an extremely fast process but requires smooth surfaces over long lengths, which is achieved in our laboratory by electropolishing or sol-gel planarization of metal alloy tapes. The research to date has demonstrated that IBAD-MgO texture can develop in less than one second. Under optimized processing conditions the in-plane mosaic spread FWHM for the MgO layer is less than 5° and less than 2° out-of-plane. In the YBCO layer the texture improves further to less than 2° in-plane and 1° out-of-plane. At this level of grain alignment critical currents in HTS are no longer limited by the grain boundaries. Critical currents for YBCO layers deposited on the IBAD-MgO templates have been steadily increasing over the last 10 years, and have been demonstrated to exceed 600 A/cm-width. An important remaining issue for coated conductors is the decrease of J_c with thickness of the HTS layer. We discuss methods of addressing this issue as well as other key outstanding challenges.

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Bio

Dr. Vladimir Matias (Matijašević) is a Project Leader for Coated Conductor Development in the Superconductivity Technology Center at Los Alamos National Laboratory. Dr. Matias received his B.S. degree with honors in Applied Physics from California Institute of Technology in 1983, and his Ph.D. in Physics from Stanford University in 1991 on superconducting films. He did his postdoctorate research fellowship on reactive molecular beam epitaxy (MBE) of oxide films at Delft University (The Netherlands) in the Quantum Transport research group. Following that he worked in industry startups Conductus, Inc. (California) and Oxxel GmbH (Germany) as a senior researcher in the field of superconducting electronics. Since 2001 Dr. Matias has been at Los Alamos National Lab as a technical staff member in the Superconductivity Technology Center. Dr. Matias has extensive research experience in growth of metal-oxide, particularly HTS, thin films and measuring their electronic and structural properties. He has published over 80 papers in this field, including book chapters and review papers, organized technical meetings and has a number of patents issued, licensed and pending applications.

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