MOCVD Fabrication and Electromagnetic Characterization of 2G-HTS

Research Themes

Second-Generation High Temperature Superconductors (2G-HTS) based on REBCO coated conductors with outstanding current carrying capacity and mechanical strength are being developed for use in various electric power applications such as power cables, Fault Current Limiters (FCLs), transformers, motors, generators, Superconducting Magnetic Energy Storage (SMES), high energy particle accelerators, offshore wind turbines, superconducting magnet for the maglev trains, Magnetic Resonance Imaging (MRI), Nuclear Magnetic Resonance (NMR), and nuclear fusion. Given the need for clean energy and energy efficient technologies, there is a worldwide demand for 2G-HTS. Furthermore, this research project has resulted in partnerships between the University of Houston and companies such as SuperPower, Inc. and Bruker. Collaborations with industrial partners are strong endorsements of the practicality of our research.

Recent Accomplishments

1. Obtaining the world-record of engineering critical current density in thin film superconductor tapes (2G-HTS)
2. Winner of the world award on applied superconductivity "2016 IEEE Council on Superconductivity Graduate Study Fellowship"
3. Alexadner Shikov Award "best student paper in materials on design and manufacturing of LTS and HTS conductors"
4. Selected to attend the student program as a future energy leader of the 2016 Advanced Research Projects Agency-Energy (ARPA-E) Energy Innovation Summit
5. Published paper as an authorized first author was selected as a "highlights of 2015 collection" by the editors of "Superconductor Science and Technology" journal, IOP
6. University awards such as "2016 HEL Scholarship Award", "2016 ABS Scholarship Award", "2015 Cora Hawley Scholarship Award", "2015 Padula Scholarship Award", "Presidential Scholarship Award" and some others
7. President of UH-MRS Chapter and served two years in a row as an MRS mentor in 2015-2016 MRS Spring Meeting

Issues

1. Structural and Electromagnetic properties of heavily-doped Zr-added (Gd,Y)BCO superconductor tapes fabricated by Metal Organic Chemical Vapor Deposition (MOCVD) is under study
2. Currently, optimization of MOCVD parameters to fabricate thin film superconductor tapes (2G-HTS) in a large-scale based on industrial demands is under performance

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