Abstract of Presentation

High performance MgB_2 wires for application in energy, lH2 and space technology

Abstract :

The new superconductor MgB_2 is a promising candidate for various applications. It has higher critical temperature (39 K) and upper critical field (>30T) than low temperature superconductors (LTS), no weak grain connections as in Cuprate Superconductors and allows to prepare cheap wires and tapes with high current densities. First pilot applications as MRI magnets (Columbus), satellites (KIT/NASA), lH_2-Tech (KIT), rotating machinery (Hypertech), Fault Current Limiters (Columbus/CESI) are promising for a broader application field.

Improved MgB_2 properties can lead to the final breakthrough of MgB_2 in applications with a successful technological and economical competition with LTS, as:

- Grain connectivity is only 10-15% of the potential. Innovative material processing has the prospects of >5 times current enhancement
- Filament densification in the conductors requires improved or innovative wire fabrication methods and treatment procedures
- Enhanced phase homogeneity with controlled introduced artificial flux pinning centres require innovative precursor materials and new processing methods.
- Innovative wire composites for enhanced engineering current densities in long lengths are crucially requested for the near break through in applications

These are the key topics of nowadays research. Together they have the potential of a transport current increase of one order of magnitude in MgB_2 wires and are proposed as work programme content of an EU and Japanese consortium. KIT contributes MgB_2 wire technology and experience in first real application in space (Suzaku satellite) and lH_2 level meters (German car industry). KIT has high performance persistent joints for magnets and is actually boosting the R&D of high current low AC loss cables for energy or accelerator magnet technology. KIT has a general focus on applications and is engaged in the same department in prototypes of Fault Current Limiters (FCL), magnets, transformers and superconducting power bars. An EU-Japan consortium should link and reinforce the European expert laboratories of leading R&D experience in either bulk and wire samples to the Japanese research. The coordination of EU and Japanese activities is multiplying the chance of MgB_2 to come to a broader and economical application.