PROJECT NUMBER

23409

Lead-free joining of Niobium based superconductors for MRI/NMR machines

A novel high-current, persistent-grade and lead-free superconducting joint between Nb-based multi-filamentary superconducting wires for MRI/NMR and other high-field applications.

Applications: MRI (Magnetic Resonance Imaging), NMR (Nuclear Magnetic Resonance), Superconducting Magnets, Power Transmission

Features	Benefits
Novel method for joining Nb (Niobium)-based multifilamentary wires, such as Nb-Ti (Niobium Titanium), using doped MgB2 (Magnesium Diboride) as a filler material	Joints enable high current flow for the generation of powerful magnetic fields using multiple superconducting coils
MgB2 has excellent superconducting properties, e.g. critical field much higher than current joint filler materials; a much higher critical temperature	Joints have higher magnetic fields can be placed easily inside the magnet cryostat – providing greater flexibility in magnet design
Resultant joints can carry hundreds of amperes at resistances well below 10-12Ω, satisfying the requirements for persistent-mode superconducting magnets	Joints with persistent-grade performance at high currents facilitate the ultra-stable fields necessary for MRI and NMR designs

Features	Benefits
No lead-based materials used in the making of the joint	Lead-free joints mitigate removal or possible weakened exemptions by Regulatory Bodies on use of of lead in medical devices
The Oxford method of joining is straight forward: no complex steps or exotic substances inhibiting manufacturing scale-up	The manufacturability and repeatability of the jointing research are important outcomes to underpin industrial scale development

Available for

- Co-development
- Consulting
- Licensing

To find out more, contact enquiries@innovation.ox.ac.uk and quote the project number.