WINNER

2003 R&D 100 Awards Winner

Flexible Superconducting Tape

The world's need for electricity has led to rising power costs; dependence on oil and coal, both of which are becoming scarce; and rising pollution levels. An ideal solution to this problem would be a technology that can transmit electricity with no resistive losses. The Laboratory has developed a superconducting tape that carries high currents in high magnetic fields at liquid-nitrogen temperatures. At such temperatures, the tape carries current with no resistance and is flexible enough to be wrapped into a tight coil with no loss of superconductivity. The innovative tape design can carry 200 times the electrical current of copper wire. Widespread use of this tape will reduce costs associated with electrical power transmission and generation, and reduce the electrical requirements of the planet, thus conserving resources and reducing global pollution.

Applications

- Instruments that require large amounts of power, such as power transmission lines, motors, generators, and transformers
- Magnetic resonance imaging for medical diagnostics
- Superconducting magnets that can play a role in magnetically levitated trains and research accelerators and colliders
- Fault current limiters and current leads
- Nuclear magnetic resonance instruments used in the chemical industry