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Abbreviated Terms

Nomenclature

$B$ Magnetic field
$ho$ Normal-state resistivity
$T_c$ Superconducting critical temperature
$\Omega$ Resistance
$T$ Temperature / Tesla
$j_s$ Supercurrent density
$e$ Charge of electron/proton
$m$ Mass of electron
$c$ velocity of the light
$E$ Electric field
$n$ Density of the free electron
$n_s$ Density of the superconducting electron
$n_n$ Density of the normal electron
$j$ Current density
$\lambda$ Superconducting penetration depth
$\lambda_L$ London penetration depth
$v_s$ Superfluid velocity
$A$ Magnetic vector potential
$\xi$ Ginzburg-Landau Coherence (GL) length
$\kappa$ Ginzburg-Landau parameter
$H_c$ Critical magnetic field
$M$ Isotope mass
$k_B$ Boltzmann constant
$\Theta_D$ Debye temperature
$\omega_D$ Debye temperature
$I_c$ Critical current
$B_c$ Critical magnetic field
$\phi_0$ Magnetic flux quantum
$J_c$ Critical current density
$H_{br}$ Irreversibility magnetic field
Abbreviated Terms

\( \delta \)  
c-axis grain fraction
\( a, b, c \)  
Unit cell parameter
\( B_{c1} \)  
Lower critical magnetic field
\( B_{c2} \)  
Upper critical magnetic field
\( B_{nir} \)  
Irreversibility magnetic field
\( H_{ext} \)  
External magnetic field
\( \rho \)  
Mass density
\( C_p \)  
Specific heat
\( K \)  
Thermal conductivity
\( L \)  
Length
\( x, y, z \)  
Cartesian coordinates
\( t \)  
time
\( h \)  
Heat transfer coefficient
\( J_0 \)  
Bessel function of first kind of zero order
\( J_1 \)  
Bessel function of first kind of first order
\( I \)  
Transport current
\( L \)  
Inductance
\( E \)  
Young’s modulus
\( v \)  
Poisson’s ratio
\( M_t \)  
Twisting moment
\( \tau_{\text{max}} \)  
Maximum shear stress
\( G \)  
Modulus of rigidity
\( \epsilon_t \)  
Maximum torsional shear stain
\( V \)  
Transport voltage
\( V_c \)  
Critical voltage
\( V_h \)  
Hall voltage
\( \theta \)  
Twist angle
\( \theta_{\text{mean}} \)  
Twist angle corresponding to the average current value of \( I_{c, \text{max}} \) and \( I_{c, \text{min}} \)
\( I_{c, \text{max}} \)  
Critical current of untwisted tape
\( I_{c, \text{min}} \)  
Critical current at the maximum twist angle
\( \delta \theta \)  
Twist interval
\( I_{c0} \)  
Critical current of untwisted tape
Abbreviated Terms

$\gamma$  
Magnetic sensitivity

$B$  
Magnetic field flux density

$R$  
Heater resistance

$V_{\text{min}}$  
Minimum heat pulse voltage

$t_p$  
Heat pulse duration

$N$  
Number of turns

$A$  
Cross-sectional area

$\Delta t$  
time difference

Acronyms and Initials

1D  
One dimensional

3D  
Three dimensional

AMSC  
American Superconductor Corporation

2G/3G  
Second/Third generation

Ag  
Silver

Ba-La-Cu-O  
$\text{Ba}_{2}\text{La}_{5.4}\text{Cu}_{5}\text{O}_{5(3-\rho)}$

BSCCO  
Bismuth strontium calcium copper oxide ($\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$)

BZO  
$\text{BaZrO}_3$

CC  
Coated conductor

CCICC  
Coated conductor in conduit cable

CeO$_2$  
Cerium oxide

CuO$_2$  
Copper oxide

DAC  
Data acquisition and control

FEA  
Finite element analysis

GPa  
Giga Pascal

GZO  
Gadolinium zirconiate

Hg  
Mercury

HBCCO  
Hg-based cuprates $\text{HgBa}_2\text{Ca}_2\text{Cu}_3\text{O}_{8+\delta}$

HTS  
High temperature superconductors

IBAD  
Ion-Beam-Assisted-Deposition

IQZ  
Initial quench zone
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Term</th>
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<tr>
<td>LaO$_{1.8}$Fe$_2$As</td>
<td>Iron oxypnictide</td>
</tr>
<tr>
<td>LHe</td>
<td>Liquid helium</td>
</tr>
<tr>
<td>LN$_2$</td>
<td>Liquid nitrogen</td>
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<tr>
<td>LTS</td>
<td>Low temperature superconductors</td>
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<tr>
<td>MgB$_2$</td>
<td>Magnesium diboride</td>
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<td>Magnesium oxide</td>
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<td>MOD</td>
<td>Metal organic decomposition</td>
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<tr>
<td>MQE</td>
<td>Minimum quench energy</td>
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<td>MRI</td>
<td>Magnetic resonance imaging</td>
</tr>
<tr>
<td>Nb</td>
<td>Niobium</td>
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<td>Nb$_3$Ga</td>
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<td>NZPV</td>
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<td>Pt</td>
<td>Platinum</td>
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<td>PLD</td>
<td>Pulsed Laser Deposition</td>
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<td>RABiTS</td>
<td>Rolling-assisted-biaxially-textured-substrates</td>
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<tr>
<td>RTD</td>
<td>Resistance Temperature Detector</td>
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<tr>
<td>SEM</td>
<td>Scanning electron microscope</td>
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<tr>
<td>STO</td>
<td>SrTiO$_3$</td>
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<td>TF</td>
<td>Toroidal field</td>
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<tr>
<td>TFA-MOD</td>
<td>Trifluoroacetates-metal organic deposition</td>
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<tr>
<td>TBCCO</td>
<td>Thallium barium calcium copper oxide (Tl$_2$Ba$_2$Ca$_2$Cu$<em>3$O$</em>{10}$)</td>
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<td>Y123</td>
<td>Yttrium barium copper oxide</td>
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<td>Yttrium barium copper oxide (YBa$_2$Cu$<em>3$O$</em>{7.8}$)</td>
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<td>Y$_2$O$_3$</td>
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<tr>
<td>YSZ</td>
<td>Yttria-stabilized zirconia</td>
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