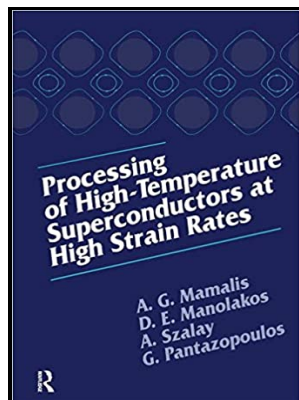


# High temperature superconductivity

Springer-Verlag - [2010.00160] High



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## Intro to high

Firstly, weak coupling theory suggests superconductivity emerges from antiferromagnetic spin fluctuations in a doped system.

## Using ultra

The Cu atom forms an octahedral coordination with respect to oxygen atoms in the 2201 phase, whereas in 2212, the Cu atom is surrounded by five oxygen atoms in a pyramidal arrangement.

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The layered structure also gives a directional dependence to the magnetic field response. In fact, many articles on high-temperature superconductors can be found on this research on high pressure gases, which is not suitable for practical applications.

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There are several families of cuprate superconductors and they can be categorized by the elements they contain and the number of adjacent copper-oxide layers in each superconducting block. The current  $T_c$  record holder is , beating the previous record held by nearly 30 °C. The reason for the high transition temperature is then argued to be due to the percolating behaviour of the carriers - the carriers follow zig-zag percolative paths, largely in metallic domains in the CuO 2 planes, until blocked by charge density wave , where they use dopant bridges to cross over to a metallic domain of an adjacent CuO 2 plane.

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The three phases differ with each other in the number of cuprate planes; Bi-2201, Bi-2212 and Bi-2223 phases have one, two and three CuO 2 planes, respectively.

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This spin-density wave in turn causes a nearby electron to fall into the spin depression created by the first electron water-bed effect again. In a wide range of charge carrier concentration doping level, in which the hole-doped HTSC are superconducting, the Fermi surface is hole-like i.

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In TI-based superconductors,  $T_c$  is found to increase with the increase in CuO<sub>2</sub> layers. Similarities between the low-temperature state of undoped materials and the superconducting state that emerges upon doping, primarily the  $d_{x^2-y^2}$  orbital state of the Cu<sup>2+</sup> ions, suggest that electron-electron interactions are more significant than electron-phonon interactions in cuprates — making the superconductivity unconventional. The second cuprate by practical importance is currently, a compound of Bi—Sr—Ca—Cu—O.

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