The Evolution from CDW to Superconductivity in Cu$_x$TiSe$_2$\(^1\)

ROBERT CAVA, Department of Chemistry, Princeton University

Charge density waves (CDWs) are periodic modulations of the conduction electron density in solids: collective states that arise due to intrinsic instabilities often present in low dimensional electronic systems. The layered dichalcogenides are the most well known examples of CDW-bearing systems, and TiSe$_2$ was one of the first CDW-bearing materials known. The competition between CDW superconducting states at low temperatures has often been characterized and discussed, and yet no chemical system has been previously reported where finely controlled chemical tuning allows for this competition to be studied in detail. This talk will describe our work [1] reporting how, upon controlled intercalation of TiSe$_2$ with Cu to yield Cu$_x$TiSe$_2$, the CDW transition is continuously suppressed, and a new superconducting state emerges near $x = 0.04$, with a maximum $T_c$ of 4.15 K found at $x = 0.08$. The anisotropic superconducting properties, obtained by characterization of the resistivity and magnetization of single crystals of Cu$_{0.07}$TiSe$_2$, will also be described.


\(^1\)Work supported by the Dept. of Energy, Solid State Chemistry program.