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The Evolution from CDW to Superconductivity in Cu_xTiSe_2[1]

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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_xTiSe_2, the CDW transition is continuously suppressed, and a new superconducting state emerges near x = 0.04, with a maximum Tc 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] E. Morosan, H. W. Zandbergen, B. S. Dennis, J. W. G. Bos, Y. Onose, T. Klimczuk, A.P. Ramirez, N. P. Ong, and R. J. Cava *Nature Physics* **2,** 544 (2006).

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