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Superconductivity in the intercalated graphite compounds C_6Yb and C_6Ca

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Low dimensionality is generally considered as a necessary ingredient for high superconducting transition temperatures. Surprisingly, perhaps, systems based on graphite have received little attention in this context. Introducing metal atoms between the carbon layers can tune the interlayer spacing and charging of the graphite host through a variety of electronic ground states. One such ground state is superconductivity, which is not present in pure graphite. Here we report the discovery of superconductivity in the intercalation compounds C_6Yb and C_6Ca, with transition temperatures of 6.5 and 11.5 K, respectively. These critical temperatures are unprecedented in graphitic systems and have not been explained by a simple phonon mechanism for the superconductivity. This discovery has already stimulated several proposals for the superconducting mechanism that range from coupling by way of the intercalant phonons through to acoustic plasmons. It also points towards the potential of superconductivity in other graphitic systems such as carbon nanotubes.