

How to make graphene superconducting

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Graphene represents a physical realization of many fundamental concepts and phenomena in solid state-physics, but in the long list of its remarkable properties a fundamental one is missing, i.e. superconductivity.

Making graphene superconducting would have great impact, as the facile manipulation of this material by nanolytographic techniques would pave the way to nanosquids, one-electron superconducting quantum dots, superconducting transistors and cryogenic solid-state coolers. Here we show how one can create and engineer a superconducting transition by adatoms' doping [1].

Density-functional theory calculations show that the occurrence of superconductivity depends on the adatoms' chosen, in close analogy to the case of graphite-intercalated compounds (GICs). However, most surprisingly, and contrary to the case of GICs, Li-covered graphene is found to be superconducting at much a higher temperature with respect to Ca-covered graphene.

References

[1] G. Profeta, M. Calandra, F. Mauri, *Nature Physics* 8, 131-134 (2012)