

# The Application of Organic and Metallo-organic Dopants in Carbon-based Electronics

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## **Abstract:**

Carbon-based materials are emerging as important components for a wide range of electronic applications. p- and n-Doping of charge-transporting materials with oxidants or reductants respectively can significantly improve the behavior of organic electronic devices. Metallo-organic and organic dopants that are sufficiently reducing to n-dope many electron-transport materials of interest, especially for photovoltaic and light-emitting diode applications, via simple one-electron transfer are typically air-sensitive. Approaches in which air-stable precursors react to form dopants during, or subsequent to, device fabrication have the potential to greatly simplify device fabrication. Here we will discuss the development of transition-metal complexes for doping of materials deposited from solution, including strongly reducing, yet air-stable, n-dopants. We will describe some recent advances, but also outstanding questions and challenges that exist for the community. Finally we will discuss the modification of the work function of transparent oxides and graphene by treatment with oxidants and reductants.