

# DSL2023

**HERAKLION, CRETE | GREECE**

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## **ABSTRACT:**

### **Red or Black Phosphorus Yield the Same Blue**

After the discovery of graphene, many other 2D materials have been predicted theoretically and successfully prepared. In this context, single-sheet black phosphorus – phosphorene – is emerging as a viable contender in the field of 2D semiconductors. Phosphorene offers a wide tunability of the band gap (0.3 to 2 eV depending on the film thickness) and many other interesting properties, such as high carrier mobility and an anisotropic structure that gives rise to a modulation of physical and chemical properties. This opens the way to many novel and fascinating applications related, for example, to field effect transistors and optoelectronic devices. In previous studies, a single layer of blue phosphorene intermixed with Au atoms was grown using purified black phosphorus as a precursor. Starting from the observation that phosphorus vapor mainly consists of P clusters, in this work we aimed at obtaining the blue phosphorus using much less expensive purified red phosphorus as an evaporant. By means of different complementary experimental techniques and theoretical calculations, we show that black or red phosphorus deposition on Au(111) substrates yields the same blue phosphorus film.