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Stability and Passivation of Phosphorene Field Effect Transistors
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PEIDE YE, Purdue Universtiy — Phosphorene is a new 2D semiconducting mate-
rial which has been intensively studied for its physical properties and potential de-
vice applications. Its high carrier mobility and thickness-dependent direct bandgap
make its promising for high-performance field effect transistors and optoelectronic
devices. However, even few layer phosphorene films are gradually degraded in air
due to its irreversible chemical reactions with oxygen and water in ambient. In or-
der to make stable phosphorene films for real device applications, we systematically
studied the different passivation methods including PMMA, 2D hBN, and atomic
layer deposited (ALD) dielectrics at different growth conditions. A combination of
hBN and ALD could be one of the final solutions for realizing the environmentally
stable phosphorene devices.

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