Black Phosphorus		
Property	**Description/Value**	
	Bulk	**Monolayer (Phosphorene)**
Lattice parameter	a_1= 3.36 Å, a_2= 4.53 Å [1]	a_1= 3.35 Å, a_2= 4.62 Å [1]
Symmetry	Orthorhombic [2, 3]	Orthorhombic [2, 3]
Atomic mass	30.97 g/mol [2, 3]	30.97 g/mol [2, 3]
Band gap type	Direct [4, 5]	Direct [4, 5]
Band gap energy	0.33 eV (experimental) [4]	1.52 eV (calculation) [5] 1.45 eV (experimental) [5]
Crystal structure	Puckered Honeycomb Structure [6]	Puckered Honeycomb Structure [6]
Solubility in water	Insoluble [2, 3]	Insoluble [2, 3]
Space Group	V_h^{18}-Bmab [7]	V_h^{18}-Bmab [7]
Spin-orbit splitting	----------	----------
Poisson's ratio	----------	0.40 [8]
Cohesive energy	----------	3.09 eV/atom [9]
In-plane stiffness	----------	----------
Density	2.69 g/cm^3 [2, 3]	2.69 g/cm^3 [2, 3]
Melting point	600 °C [10]	----------
Exciton binding energy	----------	0.9 eV [11]
P-P bond length	----------	r_1= 2.22 Å, r_2= 2.26 Å [12]
Bond Angles		α=95.9°, β=104.1° [12]
Dielectric constant	ε_x=~12.5, ε_y=~10.2, ε_z=~ 8.3 [13]	----------
Effective masses	----------	m_e= 1.24 m_o (zigzag direction), m_e= 0.16 m_o (armchair direction), m_h= 4.92 m_o (zigzag direction), m_h= 0.15 m_o (armchair direction) [14]
Effective Bohr radius	----------	----------
Thermal conductance		11.8 W/K.m [15]
Refractive Index	----------	2.6 (for near ultraviolet wavelength) [16]
Appearance	Black [2, 3]	----------
Carrier mobility in black phosphorus		
Thicknesses	**BN/SiO_2/Si substrate**	**SiO_2/Si Substrate**
Monolayer	189 cm^2/V.Sec (hole) (few layer black phosphorus) [17]	~286 cm^2/V.Sec (hole) [1]
Bulk	----------	~1000 cm^2/V.Sec (hole) [1]

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