

Article, Review

Degradation Studies of Air-Exposed Black Phosphorous and Black Arsenic Phosphorous

Usman O. Abu ¹, Dinushika Vithanage², Ashan Vitharana², Jacek B. Jasinski^{1,*} and Gamini Sumanasekera^{2,*}

¹ Conn Center for Renewable Energy Research, University of Louisville, KY 40292, USA; usman.abu@louisville.edu, jacek.jasinski@louisville.edu

² Department of Physics & Astronomy, University of Louisville, KY 40292, USA; ahangamavithanagedi-nushika.vithanage@louisville.edu, ashan.vitharana@louisville.edu, gamini.sumanasekera@louisville.edu

* Correspondence: jacek.jasinski@louisville.edu, gamini.sumanasekera@louisville.edu

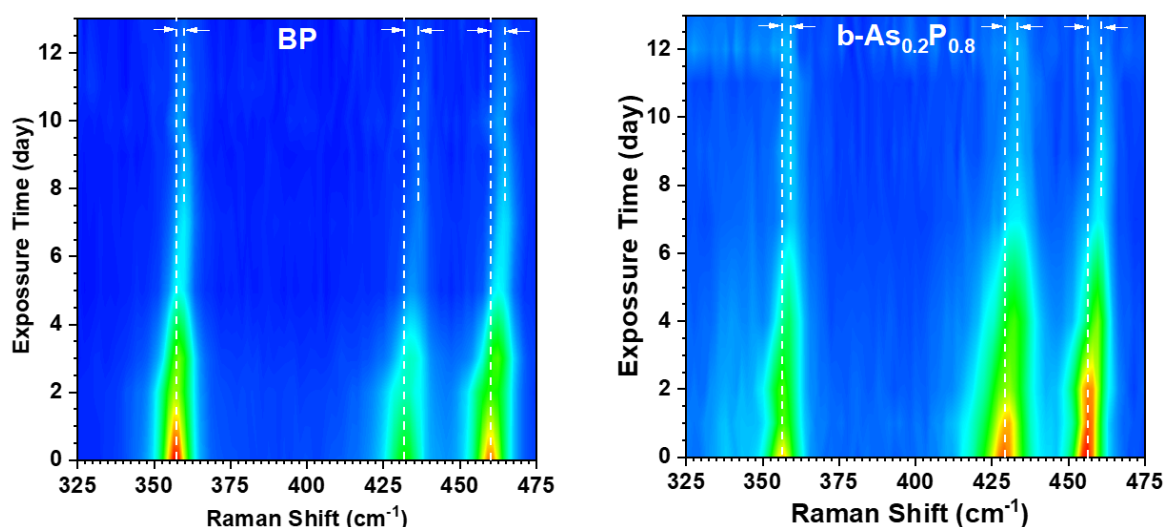


Figure S1: Degradation color maps highlighting the vanishing Raman modes of BP and $\text{As}_{0.2}\text{P}_{0.8}$ as time evolves. (a) BP (b) $\text{As}_{0.2}\text{P}_{0.8}$.

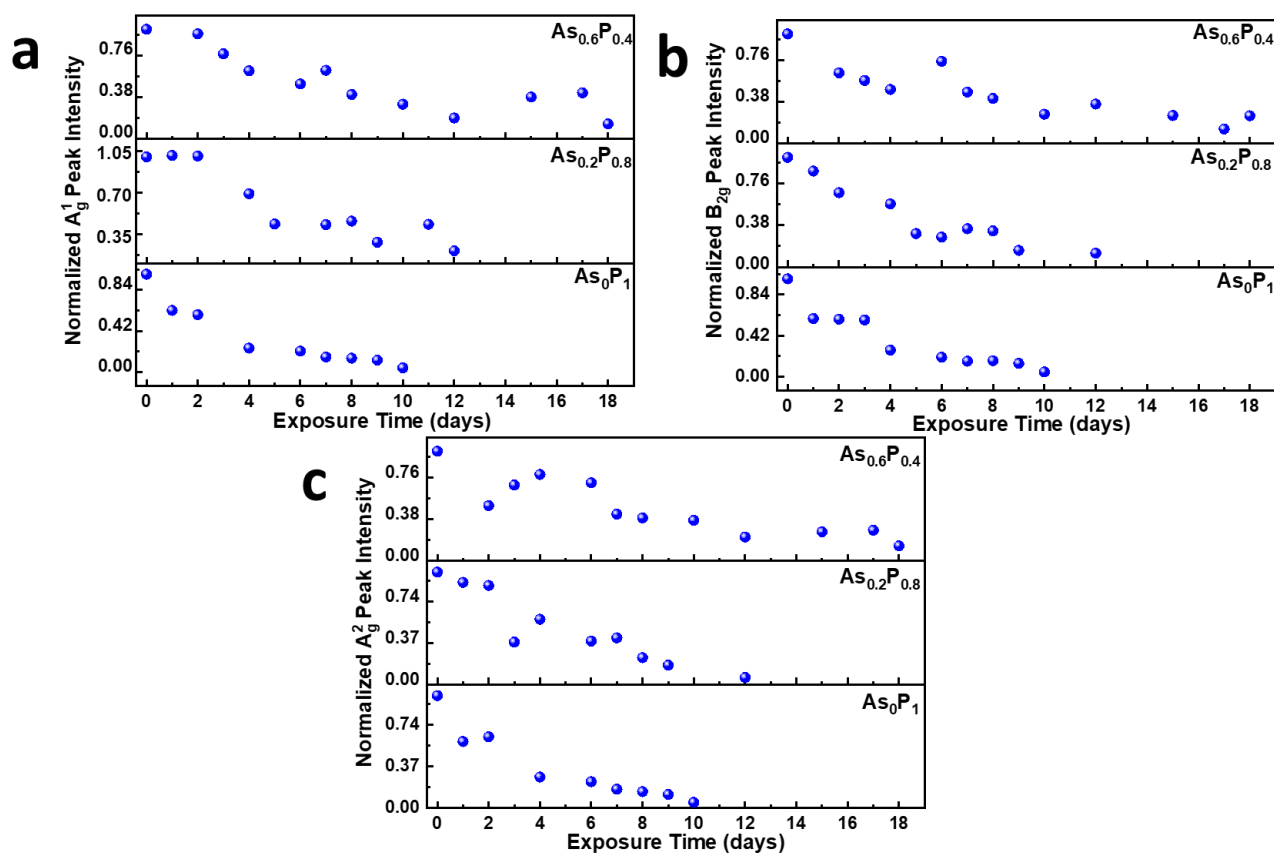


Figure S2: Degradation of the peak intensities of P – P Raman vibration modes. (a) A_{1g}^1 (b) B_{2g} (c) A_{1g}^2 .

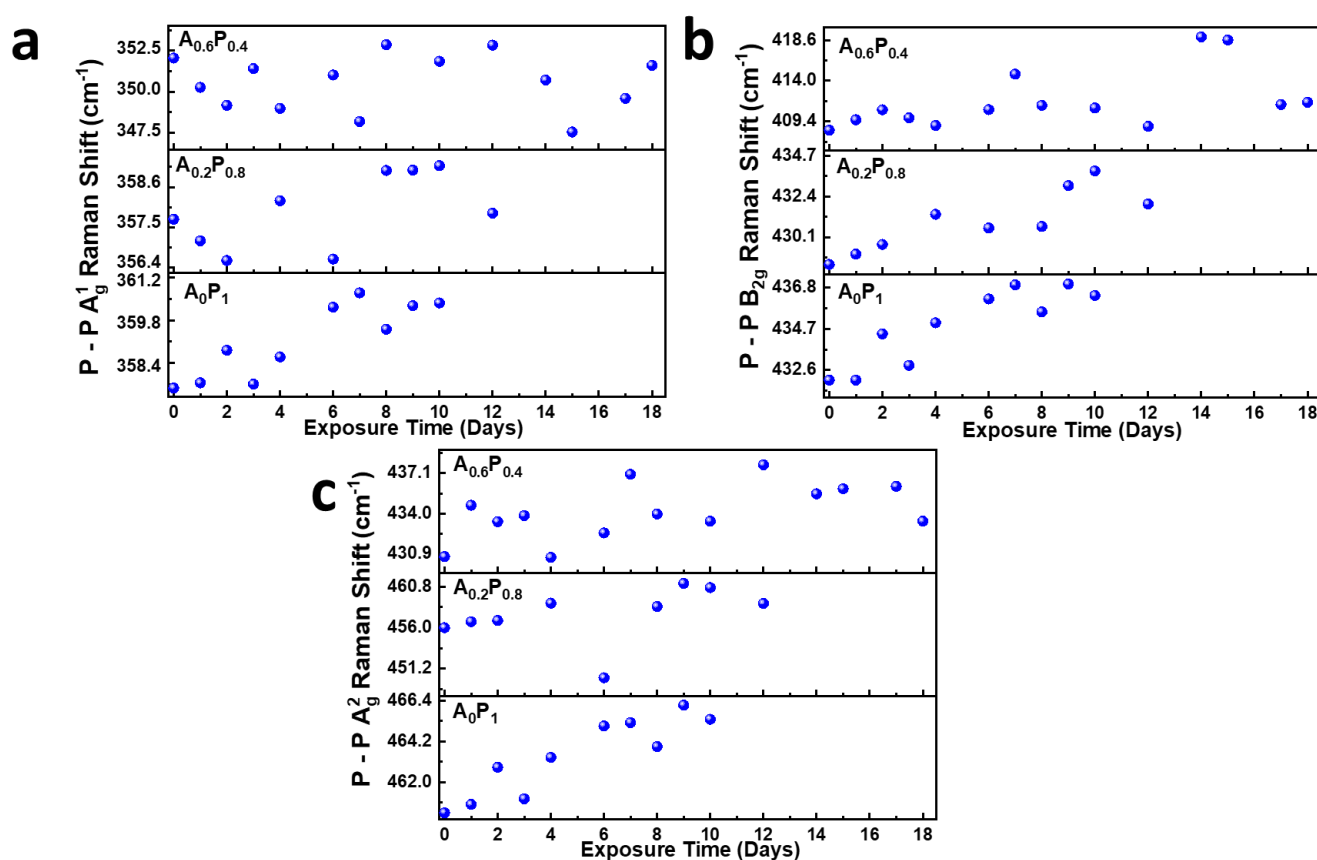
Figure S3: Peak positions for P – P Raman vibration modes. (a) A_g^1 (b) B_{2g} (c) A_g^2 .

Table S1: Decay function parameters for Raman spectra.

Sample	Characteristic Decay Time, τ (days)
BP	4 ± 1
$As_{0.2}P_{0.8}$	5 ± 1
$As_{0.6}P_{0.4}$	11 ± 3

Table S2: Growth function parameters for normalized thermoelectric power (TEP).

Sample	Characteristic Growth Time, τ (min)
BP	166 ± 4
$As_{0.4}P_{0.6}$	226 ± 12

Table S3: Decay function parameters for normalized resistance.

Sample	Characteristic Decay Time τ , min
BP	40 ± 7
$As_{0.4}P_{0.6}$	176 ± 21

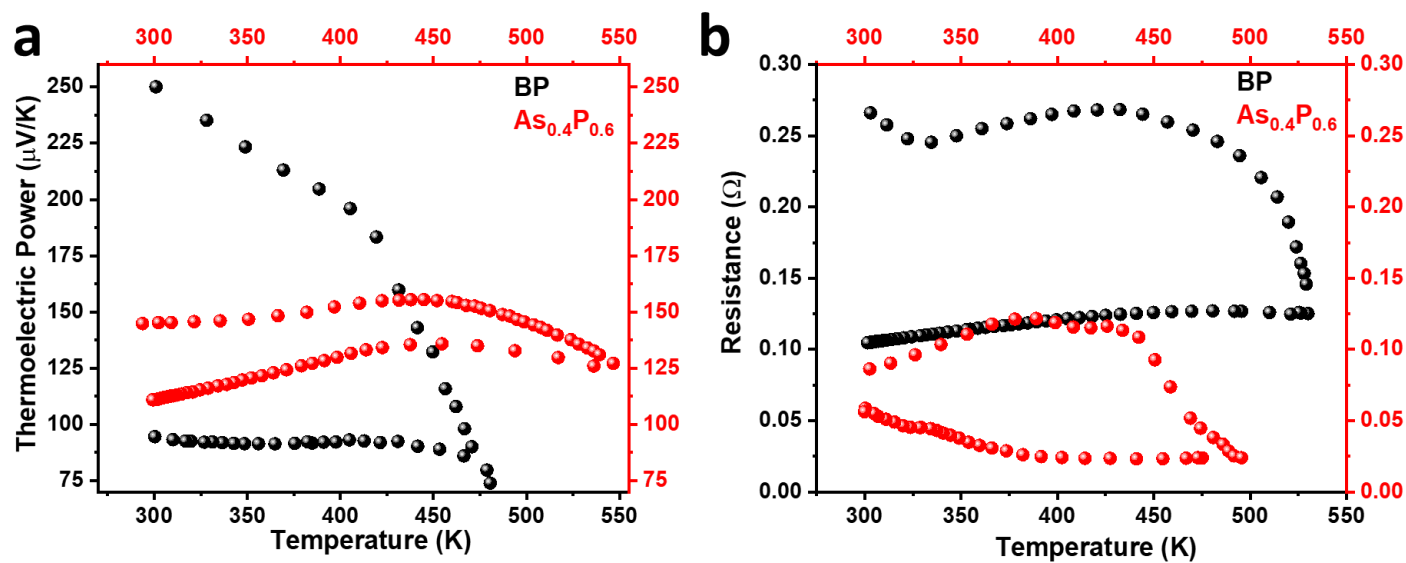


Figure S4: Response of the electrical transport properties of BP and $\text{As}_{0.4}\text{P}_{0.6}$ to heating and cooling. (a) TEP and (b) resistance.