

Abstract Submitted
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Raman spectroscopy of ultra-thin black phosphorus with defects

ALEXANDRE FAVRON, Universite de Montreal, JEAN-FRANCIS GERMAIN, ANNE-LAURENCE PHANEUF-L'HEUREUX, Polytechnique Montreal, VINCENT GOSSELIN, JULIEN GROULX, MICHEL COTE, RICHARD LEONELLI, Universite de Montreal, SEBASTIEN FRANCOEUR, Polytechnique Montreal, RICHARD MARTEL, Universite de Montreal — Thin layers Black phosphorus (P-black) have raised interest for their low-dimensional properties. The material exhibits high mobility, tunable bandgap, and other interesting anisotropic optical and electrical properties. However, thin layers of P-black are unstable in air, which represents a challenge for making experiments. Here we present a Raman study on the influence of a degradation of ultra-thin layers on the Raman properties. Our results reveal the presence of defect-induced Raman modes as well as other signatures in the relative Raman intensity. The multiple expositions to ambient conditions provide insight on the nature of these modes. The analysis of those modes explains the intensity ratio (A1g over A2g) and the appearance of these modes, which involves among other effects, second-order Raman modes.

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