

Liquid-phase Exfoliation of Germanium Monosulfide

JB Boland, Damien Hanlon, Jonathan Coleman

Trinity College Dublin, Dublin 2, Ireland
bolandjb@tcd.ie

Abstract

Since the introduction of graphene in 2004 there has been widespread research of two-dimensional materials in the area of nanoscience. Primary focus was initially placed on graphene, however many other nanomaterials have shown promise, such as boron nitride (BN) and transition metal dichalcogenides (TMDs) to name but a few.

Hanlon, D., et al. have produced nanosheets of black phosphorus (BP); a new layered material which shows great promise for optoelectronics.¹ Here we show the extension of the exfoliation process described to germanium monosulfide (GeS), a novel two-dimensional semiconductor material. The GeS monolayer is isoelectronic to that of black phosphorus.

We demonstrate that high-quality, few-layer GeS nanosheets, with controllable size can be produced in large quantities through the use of liquid phase exfoliation under ambient conditions in solvents such as N-methyl pyrrolidone and 2-propanol. Also shown is testing of these nanosheets for potential applications in battery electrodes.

References

[1] Hanlon, D. et al., *Nat. Commun.*, **6**, 8563 (2-15).

Figures

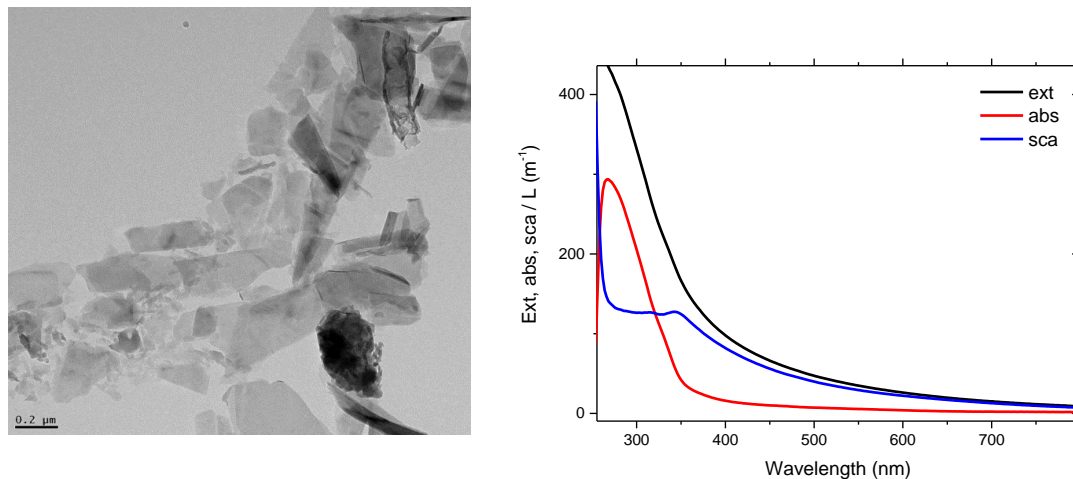


Figure 1: A) TEM image of GeS nanosheets produced from Liquid phase exfoliation, B) Ultra-Violet Visible spectra showing absorption, extinction and scattering data.