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Structural and electronic properties of Copper sulphide (Cu₂S) and copper selenide (Cu₂Se) powders

The structural and electronic properties of Cu₂S and Cu₂Se powder samples were investigated using X-Ray Powder Diffraction (XRD), UV-vis spectroscopy and Fourier transform infrared spectroscopy (FTIR) and Current-voltage (I-V) measurements. XRD was used to calculate the lattice constants and crystal size of both materials. The lattice parameters of Cu₂S and Cu₂Se were calculated were found to be $a = b = c = 5.518 \text{ \AA}$ and $a = b = c = 5.750 \text{ \AA}$ respectively, which shows the cubic structures for both materials. The outstanding peak 220, which was observed in both XRD illustration results represents the Cu ions. The calculated crystal size of Cu₂S and Cu₂Se samples were found to be 7.076 \AA and 8.985 \AA respectively. FTIR characterisation revealed defects in the form of similar functional groups, such as O-H stretching and N-H stretching vibrations for both materials. Through UV-vis characterisation both materials show good absorption in the visible and near-infrared light regions. The calculated Optical band gaps of Cu₂S and Cu₂Se is 4.35 and 4.50 eV respectively, which suggests semiconductor materials. The I-V measurement curve indicate semiconductor characteristics and some degree of diode characteristics behaviour.

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None

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