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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 Å and a = b = c = 5.750 Å 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 Å and 8.985 Å 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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