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Facile ultrasound-assisted synthesis of ZnO nanorods in an ionic liquid

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ABSTRACT

ZnO nanocrystals have been synthesized by ultrasound-assisted synthesis from $Zn(CH_3COO)_2 2H_2O$ and NaOH in the neat room-temperature ionic-liquid 1-butyl-3-methylimidazolium bis(trifluoromethanesulfonyl) amide, $[C_4mim][Tf_2N]$. Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) show that the formed ZnO nanocrystals are of rod like shape with lengths from 50 to 100 nm and diameters of about 20 nm. X-ray diffraction (XRD) confirms the crystallinity as well as the sample purity. The band gap of the as-prepared ZnO nanorods was estimated to be 3.31 eV from UV–Vis absorption measurements. The photoluminescence spectrum shows the characteristic greenish emission of ZnO at room temperature (λ_{max}=563 nm). The ZnO bonding levels have been determined by X-ray photoelectron spectroscopy (XPS). Nitrogen adsorption–desorption measurements show typical samples to have a specific surface area of 49.93 m^2/g.