Zinc Glycolate: A Precursor to ZnO

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1. Experimental Section:-

1.1 Chemicals and Materials

Zinc chloride (98%, ACS, Sigma-Aldrich), ethylene glycol (99%, Merck-India) and sodium hydroxide (97%, SDF Chem.), were used for synthesis without further purification.

1.2 Characterization

X-ray diffraction (XRD) data were collected from powder samples using a PANalytical X'pertpro MPD diffractometer with monochromatic Cu Kα radiation (λ=1.54056 Å). Scanning electron microscopy (SEM) images were taken using JEOL JSM-840, and energy dispersive X-ray spectroscopy (EDXS) is attached to the SEM instrument. The fourier transform infrared (FTIR) spectra of the samples were recorded on a JASCO FT/IR-4100 spectrometer. Thermogravimetric analysis (TGA) measurements were performed on a NETZSCH, STA 409 PC analyzer with a heating rate of 5 ºC/min under a flow of N_2-gas. Solid state ^{13}C-NMR spectrum was taken using a 500 MHz BRUKER Spectrometer. Photoluminescence data were obtained using Spex Fluorolog 1681 spectrometer. Prior to data collection, all samples in water solution were sonicated to obtain visually nonscattering dispersion and the data were taken immediately.

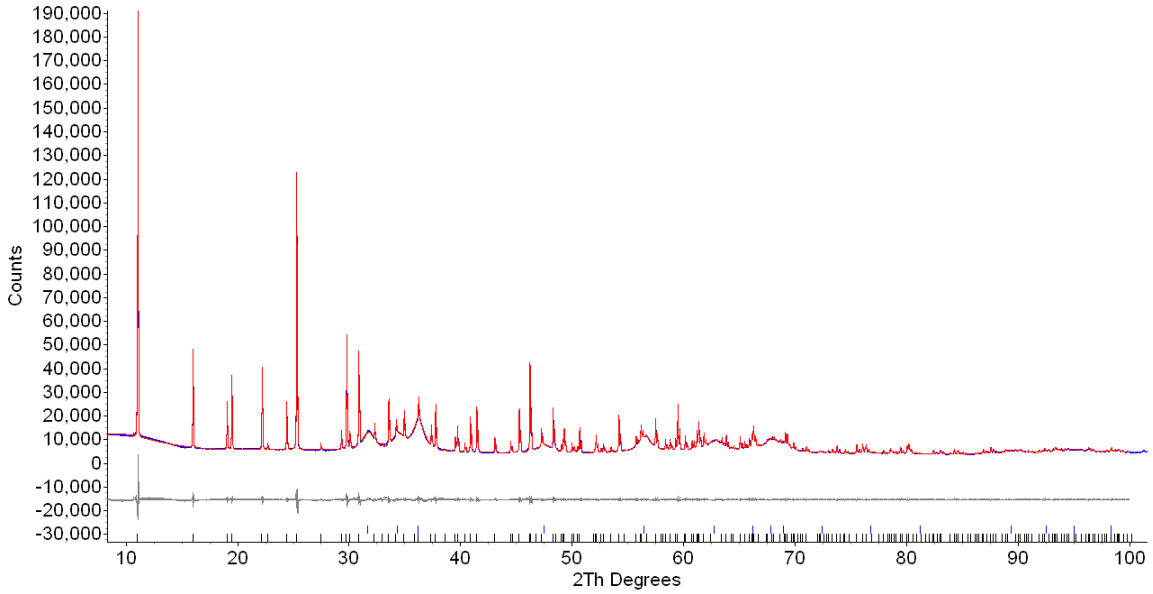

Figure S1: Pawley fit to the room temperature powder XRD pattern of the precursor material, showing the peaks of Zn-glycolate as the highly crystalline main phase and small amounts of poorly crystalline ZnO (wurtzite form) as a second phase.

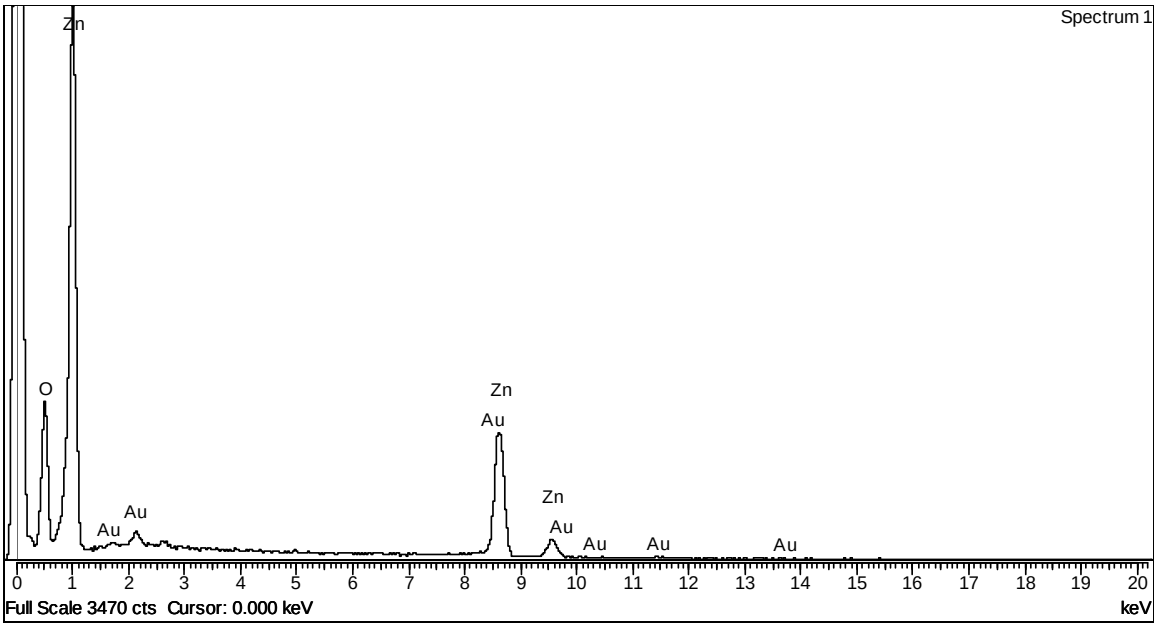

Figure S2. EDX analysis of an individual zinc glycolate bi-pyramidal structures. (Presence of Au is due to the gold coating that is necessary for SEM analysis of non-conductive samples)

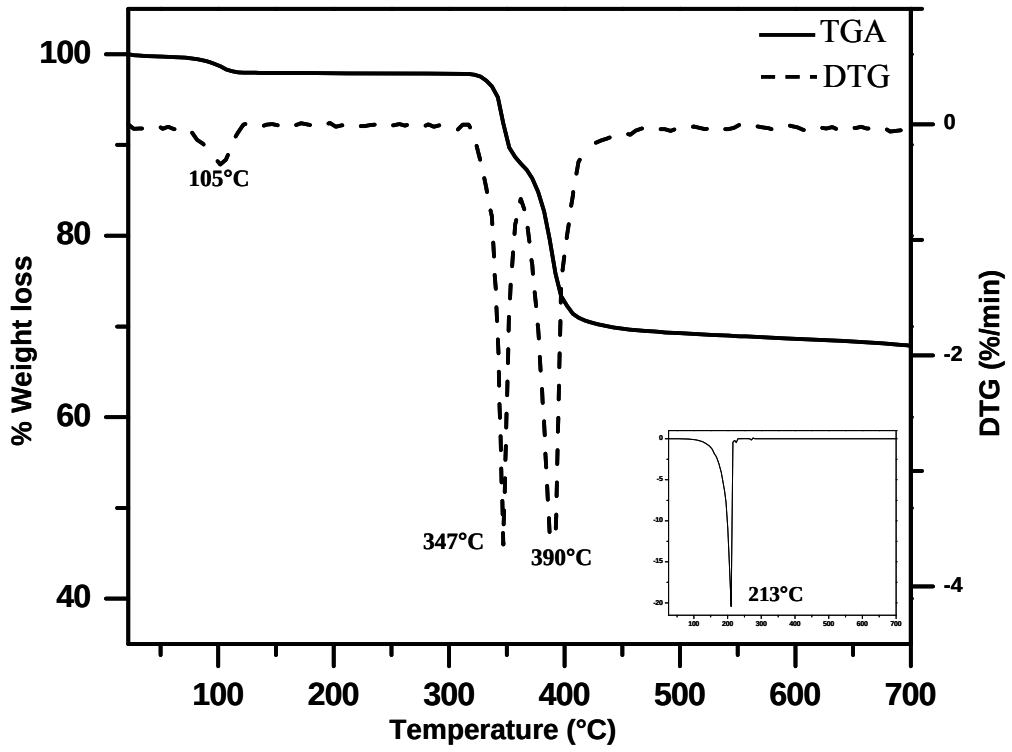

Figure S3. TGA curve showing the weight loss for as synthesized zinc glycolate as a function of temperature and its corresponding derivative curve (DTG). (Inset, DTG curve of pure ethylene glycol showing a peak at 213 °C)

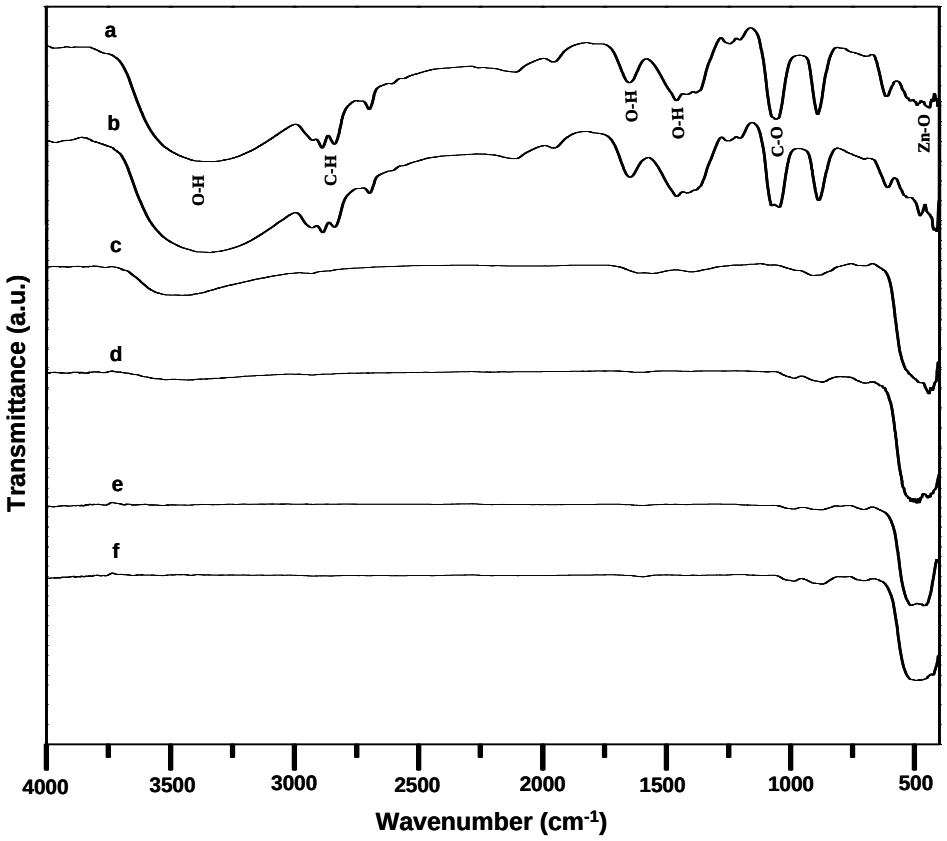

Figure S4. FTIR spectra that were obtained from powder samples at different temperatures. (a) Zinc glycolate, and after it has been annealed to (b) 200°C, (c) 400°C, (d) 600°C, (e) 800°C and (f) 1000°C.

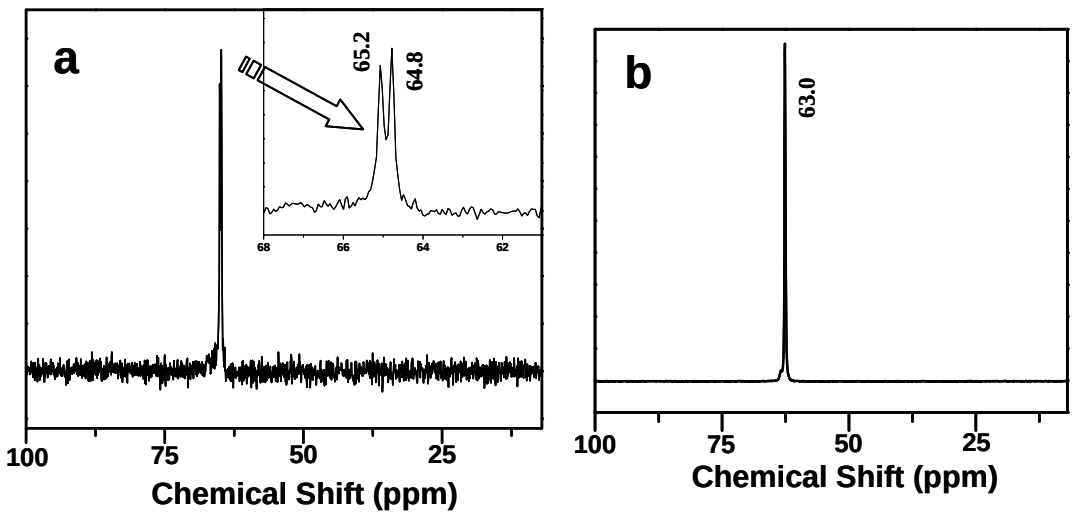

Figure S5. (a) Solid state CP/MAS ^{13}C-NMR spectrum of zinc glycolate (inset, enlarged view revealing two distinct peaks) and (b) solution spectrum of pure ethylene glycol