

# **Novel single pot synthesis of metal (Pb, Cu, Co) sulfide nanomaterials - Towards a quest for paintable electrode materials that supersedes Pt electrode**

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## **Scanning Electron Microscopy (SEM):**

In order to understand the surface morphology of the metal sulfide samples scanning electron microscopy (SEM) studies have been carried out for the samples PbS(2), CuS(3) and CoS(2) samples and the corresponding images are provided in the supporting information. The SEM images of PbS(2) sample are shown in figure S1. It has been observed from figure S 1 that there are several morphologies exist in this sample which shows the un-controlled aggregation of the particles. However from figure S1(b) it is observed that the sample consists of mostly the nanorods which resemble the forest like growth, misaligned with respect to each other, but without any branching. The rods extend upto few microns in length. In addition to the nanorods, PbS found to consist of sphere type of morphology. Figure S1(c) shows the EDAX pattern of PbS sample which reveals the presence of Pb and S elements.

Figure S2 shows the SEM image of CuS(3) sample. The micrographs reveal a cauliflower type of morphology which is clearly visible form the figure S2 (b). Moreover from figure S2(c) and (d) it is clear that cauliflower morphology is made up of irregular sized spheres. Figure S2(e) shows the EDAX pattern of CuS(3) sample which confirms the presence of expected Cu and S elements.

SEM images of CoS(2) sample are shown in figure S3. The micrographs of the CoS(2) sample reveal a granular morphology comprising of compactly packed grains 100– 400 nm in

size. The EDAX pattern shown in figure S3(b) confirms the presence of expected Co and S elements which further confirms the purity of the sample.

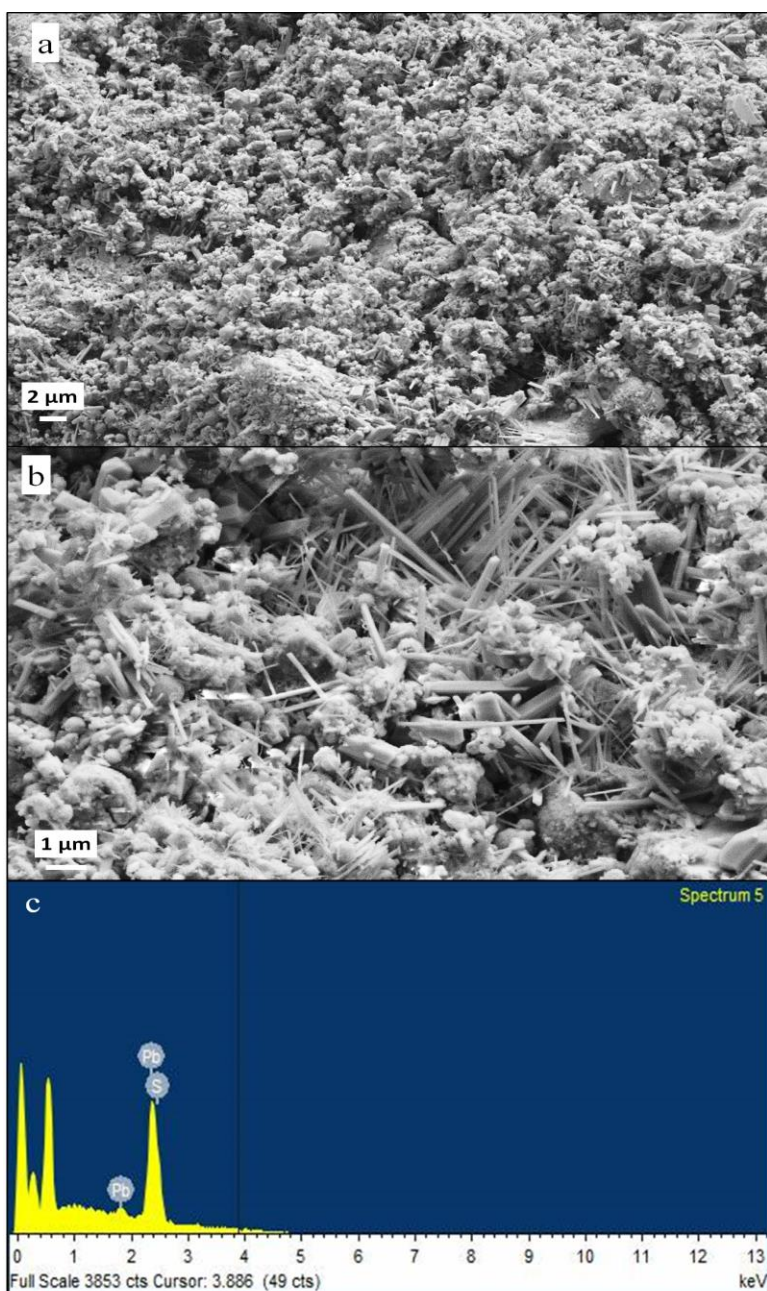


Figure S1

**Figure S1. (a) SEM image of PbS(2) sample**

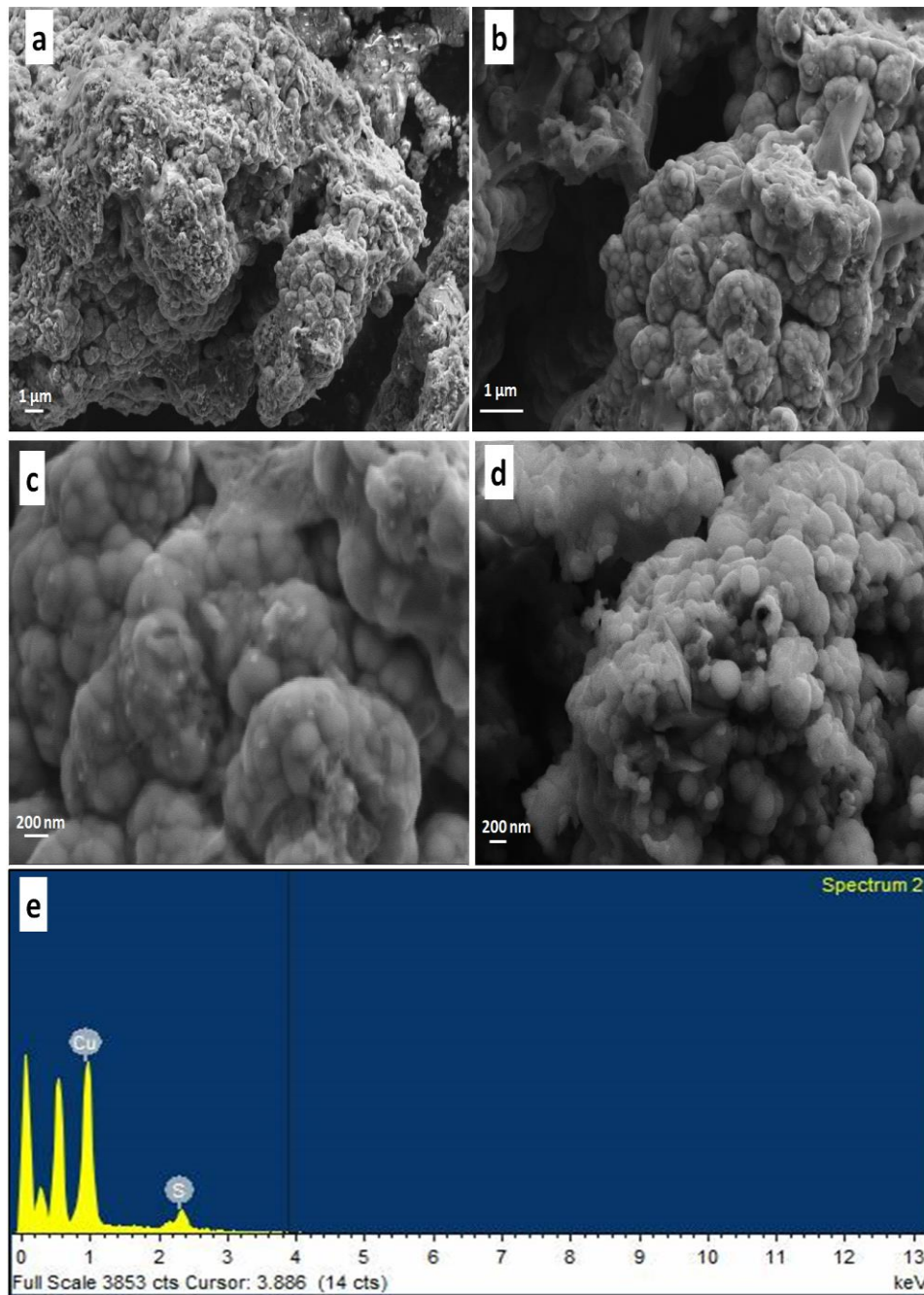


Figure S2

Figure S2. SEM images of CuS(3) sample

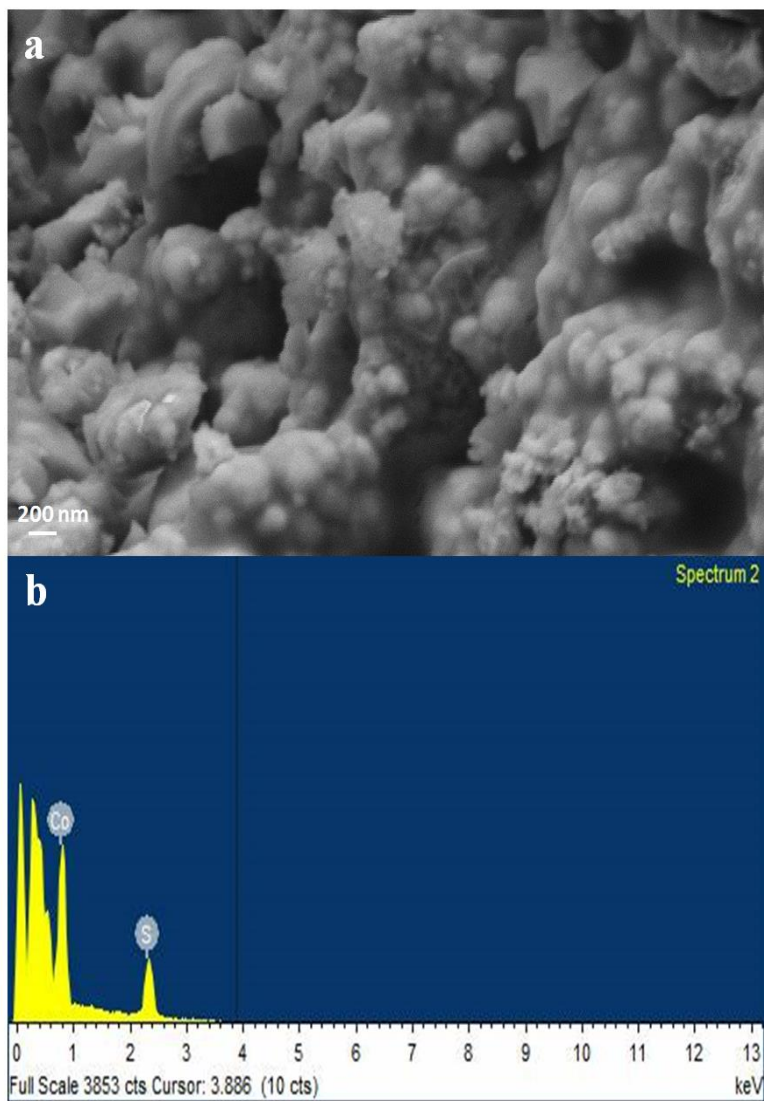


Figure S3

Figure S3. SEM image of CoS(2) sample