

Supporting information

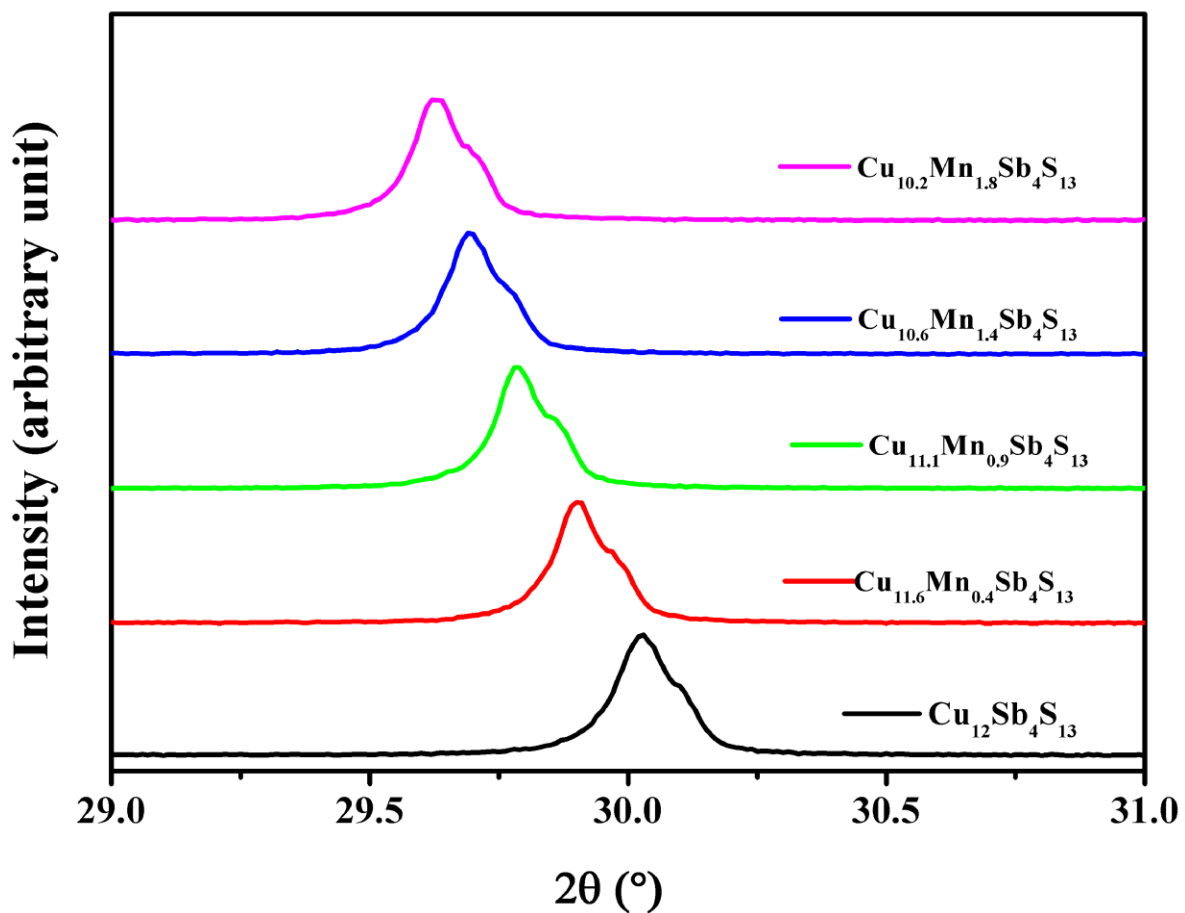


Figure S1. Maximum intensity peak of all the samples related to the (222) plane.

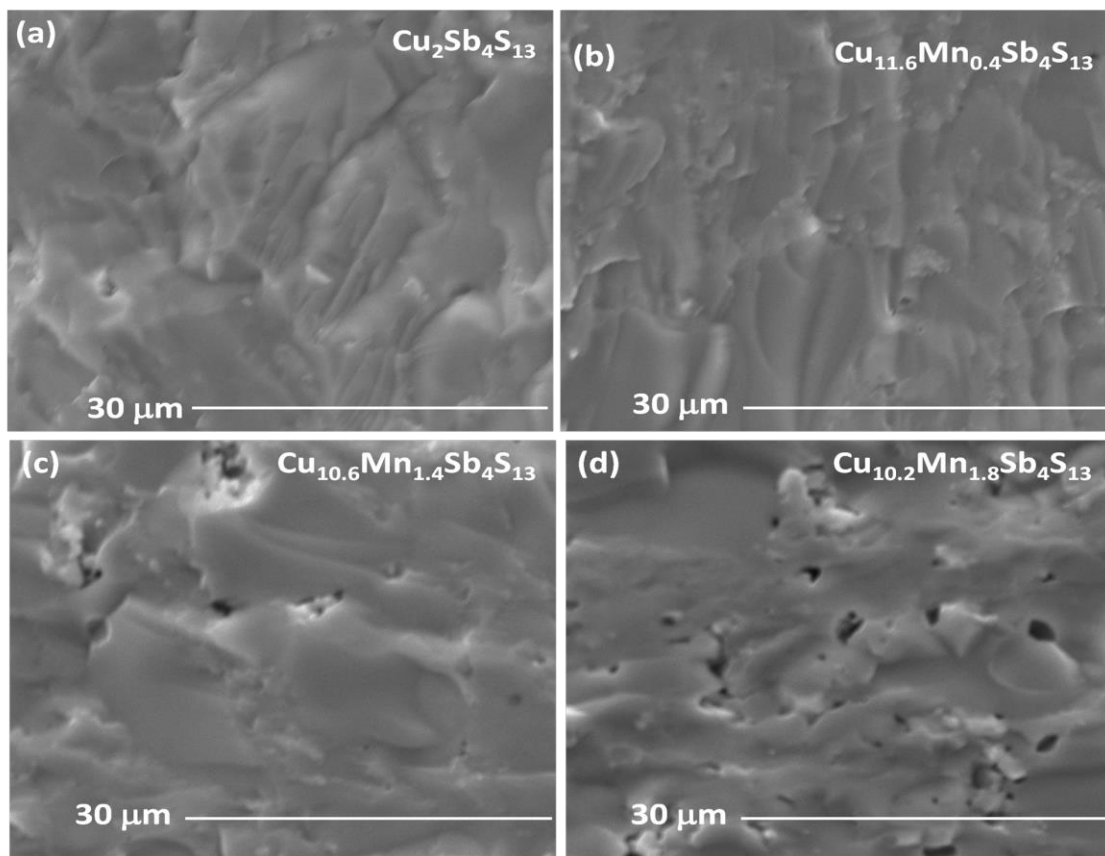


Figure S2. (a-d) secondary electron SEM images for  $\text{Cu}_{12-x}\text{Mn}_{1-x}\text{Sb}_4\text{S}_{13}$  ( $x = 0, 0.4, 1.4, 1.8$ ).

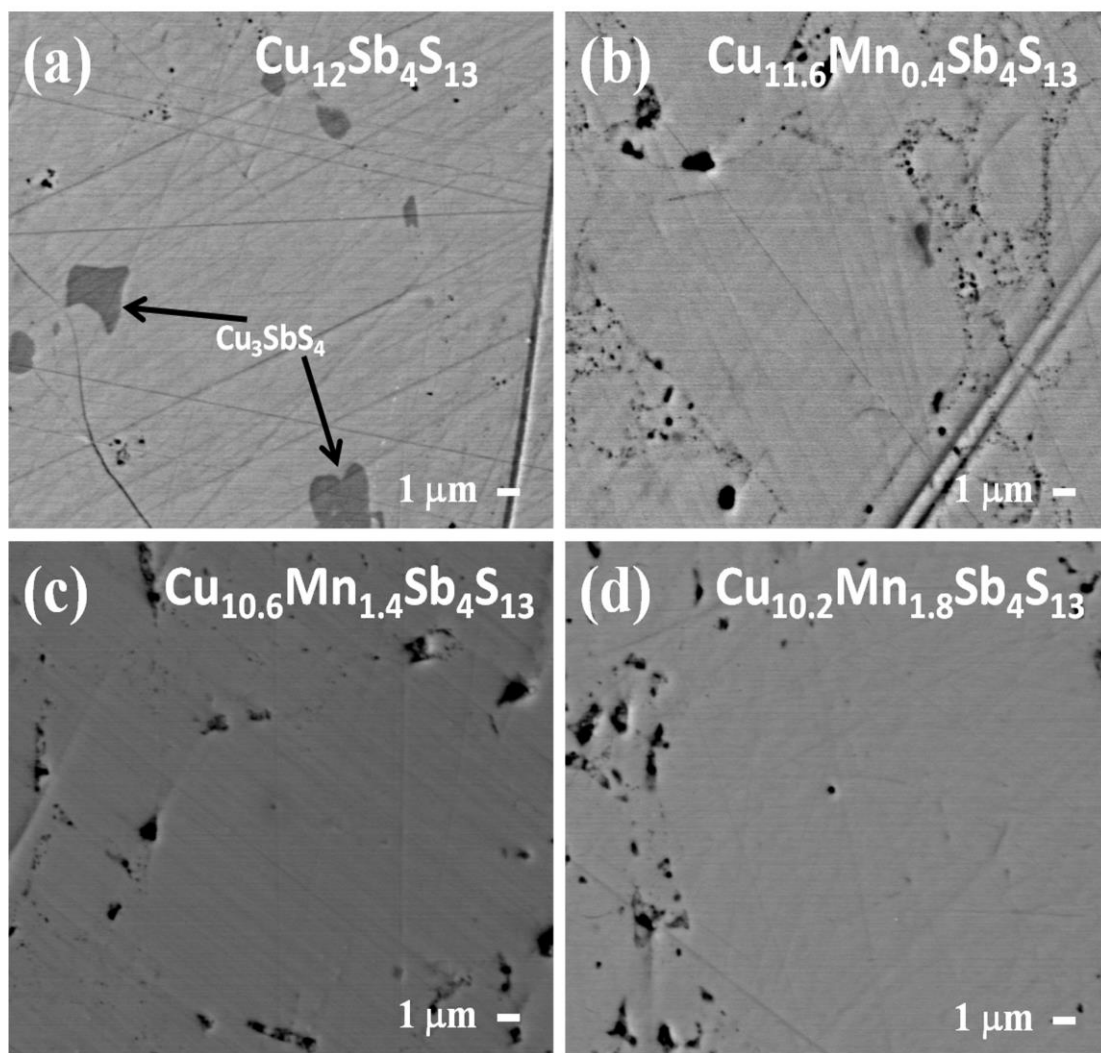


Figure S3. (a-d) Back scatter electron micrographs for  $\text{Cu}_{12-x}\text{Mn}_{1-x}\text{Sb}_4\text{S}_{13}$  ( $x = 0, 0.4, 1.4, 1.8$ ).