



Fig. S1. The XRD analysis of the primary ore samples. (■)  $\text{Fe}_3\text{O}_4$ ; (▲)  $\text{FeS}_2$ ; (●)  $\text{CuFeS}_2$ ; (□)  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ; (△)  $\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6$ ; (○)  $\text{Fe}_7\text{S}_8$  (★) S.