

## Electronic Supplementary Information

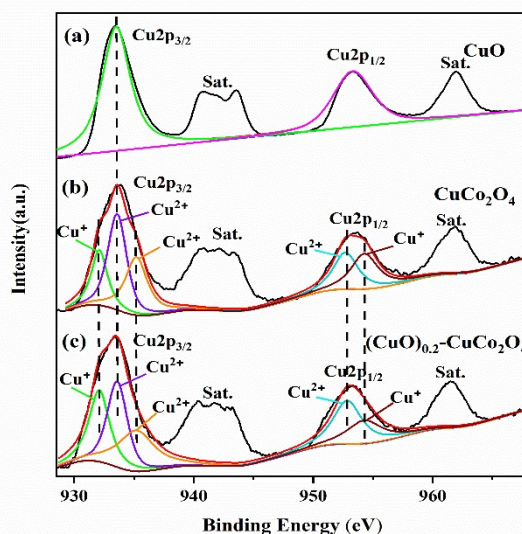


Fig. 6. XPS spectra of Cu2p of CuO (a), CuCo<sub>2</sub>O<sub>4</sub> (b) and (CuO)<sub>0.2</sub>-CuCo<sub>2</sub>O<sub>4</sub> (c) composite oxide.

We used the integrated area values of the Cu2p peaks in the XPS data to calculate the Cu<sup>+</sup> / Cu<sup>2+</sup> ratio. As shown in Fig. 6, the values of the integrated areas of the Cu<sup>+</sup> and Cu<sup>2+</sup> peaks are shown below from left to right.

CuCo<sub>2</sub>O<sub>4</sub>:

$$\text{Cu}^+ = 28576, \text{Cu}^{2+} = 52341, \text{Cu}^{2+} = 41750, \text{Cu}^{2+} = 29412, \text{Cu}^+ = 30810.$$

$$\text{Cu}^+ / \text{Cu}^{2+} = 28576 + 30810 / 52341 + 41750 + 29412 = 59386 / 123503 = 0.48$$

(CuO)<sub>0.2</sub>-CuCo<sub>2</sub>O<sub>4</sub>:

$$\text{Cu}^+ = 46544, \text{Cu}^{2+} = 49121, \text{Cu}^{2+} = 47502, \text{Cu}^{2+} = 39882, \text{Cu}^+ = 25962.$$

$$\text{Cu}^+ / \text{Cu}^{2+} = 46544 + 25962 / 49121 + 47502 + 39882 = 72506 / 136505 = 0.53$$