

## Solution Based Synthesis of Copper Bismuth Oxide and NiO Hole Transport Layer

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Copper bismuth oxide (CBO) is a p-type semiconductor material which has 1.8eV band gap and 19.7mA/cm<sup>2</sup> of theoretical photocurrent density. The p-type Conductivity comes from the copper vacancy states near the valence band edge. CBO fulfills several requirements for the photoelectrochemical water splitting photocatalyst, 1) proper band gap (1.8eV) 2) appropriate band alignment for hydrogen reduction and 3) earth abundant and low cost of fabrication. But CBO has poor charge transfer activity, slow kinetics and photocorrosion caused by trapping of photoelectrons in the Cu 3d band. To overcome disadvantages, 1) optimizing the synthesis method, 2) improve charge transfer activity by using dopant or junction, and 3) passivation layer for stability are required. Nickel Oxide (NiO) is a wide-band gap p-type material which has been used as hole transport layer (HTL) in various semiconductor devices. NiO underlayer can act as effective hole selective back contact for CBO and FTO interfaces.

In this study, CBO and NiO underlayer were synthesized with solution based method and improved photocurrent density was observed.