$CuFeO_2$ Inverse Opal Photocahotde for CO_2 reduction

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Because of the global energy and environmental crisis caused by fossil fuels, interest in clean and renewable energy sources is increasing. Lately, CO2 conversion into fuel has received much of attraction to solve both problems at a time. Among various approaches, photo-electrochemical cell could be the most promising technique since it costs the least of electrical energy to convert CO2 into fuel with aid of sunlight.
Herein, CuFeO2 delafossite material was chosen as a semiconductor material because it showed good light absorption properties (Eg=1.45 eV), suitable band edge position and good stability in aqueous environment. Despite of these advantages, relatively thin charge harvesting depth of CuFeO2 film limit its use. To handle this limitation, I introduce highly porous inverse opal structure of CuFeO2 to reduce the charge diffusion length as well as increase the surface area. It has been under way to identify how the periodic 3-D porous structure can influence on charge carrier dynamics and efficiency of CO2 conversion reaction.