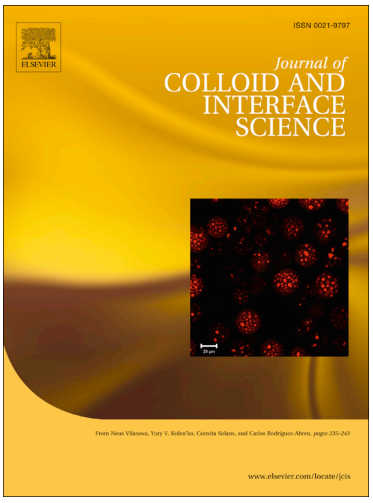

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Fabrication of nano copper oxide evenly patched on cubic sodium tantalate for oriented photocatalytic reduction of carbon dioxide

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Abstract: A synthetic process was exploited to fabricate patchy CuO evenly planted on cubic $NaTaO_3$ for photocatalytically reducing CO_2 in isopropanol. The nano patches of CuO with about 15 nm in size were uniformly distributed on the surface of $NaTaO_3$ via a phase-transfer protocol and solvothermal synthesis. The crystal phase, morphology, composition, optical absorption and charge separation of as-prepared CuO-$NaTaO_3$ were characterized by XRD, SEM, TEM, EDX, XPS, UV-Vis and PL. The results of photocatalytic reduction of CO_2 confirmed that the CuO patched $NaTaO_3$ possessed better ability to separate charge carriers and selectively reduce CO_2 to methanol than CuO directly loaded $NaTaO_3$ using the traditional liquid phase reduction procedure after comparing the methanol yields. Furthermore, 5wt% CuO patched $NaTaO_3$ led to the highest methanol yield of 1302.22 μmol g^{-1} h^{-1}. A redox mechanism was proposed and illustrated in a schematic diagram.

Keywords: photocatalysis, $NaTaO_3$ nanocube, patchy CuO, reduction of CO_2, methanol yield