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**Carbon nanofibers based copper /zirconia catalysts for carbon dioxide
hydrogenation to methanol: Effect of copper concentration**

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Abstract: A series of novel bimetallic copper/zirconia carbon nanofibers supported catalysts with different Cu contents (5–25 wt.%) were synthesized via deposition precipitation method. The physicochemical characterization of the calcined catalysts was carried out by X-ray diffraction, inductively coupled plasma optical emission spectroscopy, N₂ adsorption–desorption, N₂O chemisorption, temperature programmed reduction, X-ray photoelectron spectroscopy, high resolution transmission electron microscopy and temperature programmed CO₂ desorption. Structure-reactivity correlation for catalytic hydrogenation of CO₂ to methanol was discussed in details. Reaction studies revealed 15 wt.% as optimum Cu concentration for CO₂ conversion to methanol with CO₂/H₂ feed volume ratio of 1:3. Cu surface area was found to play a vital role in methanol synthesis rate. CO₂ conversion was observed to be directly proportional to the number of total basic sites. A comparative study of this novel catalyst with the recently reported data revealed the better CO₂ conversion at relatively low reaction temperature.

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