

Physico-Chemical and Catalytic Properties of Mesoporous CuO-ZrO₂ Catalysts

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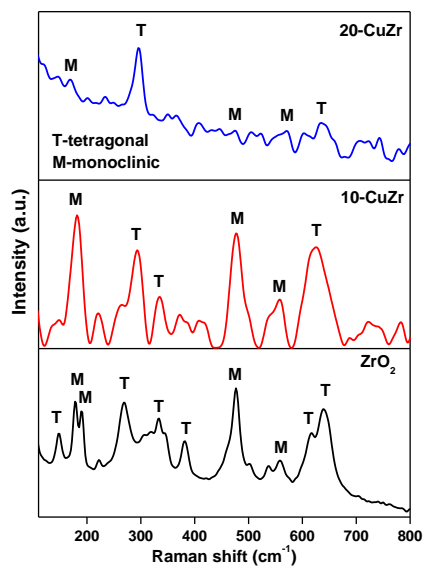


Figure S1. Raman spectra of the samples.

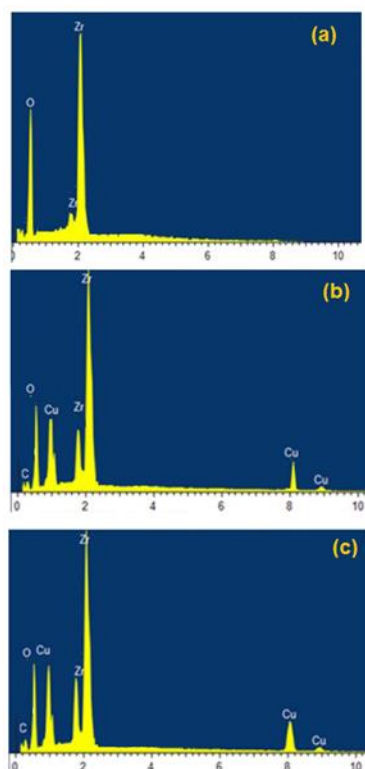


Figure S2. EDX spectra of (a) ZrO₂ (b) 10-CuZr and (c) 20-CuZr samples.

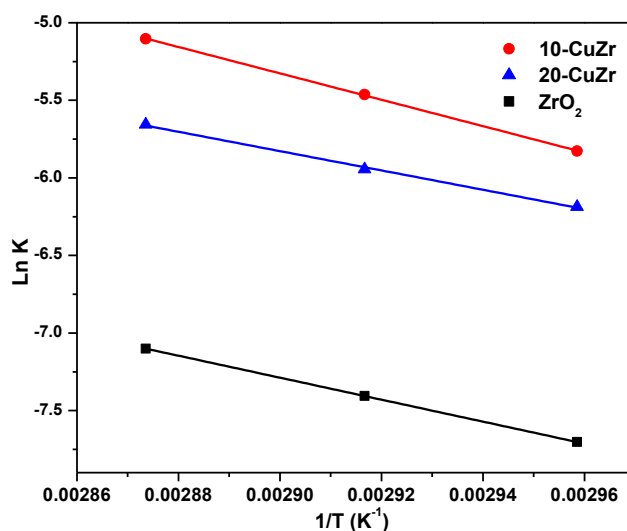


Figure S3. Arrhenius plots of benzylation reaction for all the catalysts.

Table S1. Activation energies (E_a), TON and TOF for the catalytic reaction conducted over different catalysts.

Catalyst	E_a (KJ mol ⁻¹)	TON	TOF (h ⁻¹)
ZrO ₂	65.9	993.2	97.8
10-CuZr	59.2	12345.2	1234.5
20-CuZr	62.3	9832.1	983.1

Reaction conditions, temperature = 75 °C, benzene/benzyl chloride stoichiometric ratio = 15 and 0.1 g of catalyst; E_a = activation energy;

Lattice cell parameters were determined based on the “ d ” spacing (d) of (101) and (112) of the tetragonal phase observed in ZrO₂, 10-CuZr and 20-CuZr samples.

Tetragonal Phase:

$$\frac{1}{d^2} = \frac{h^2 + k^2}{a^2} + \frac{l^2}{c^2} \quad (1)$$

Table S2. Crystal Lattice parameters measured from XRD analysis.

Sample	d -spacing	$a = b$	c
ZrO ₂	(101)	2.9608	5.124
	(112)	1.8126	3.627
10-CuZr	(101)	2.9373	5.271
	(112)	1.8144	3.537
20-CuZr	(101)	2.9484	5.164
	(112)	1.8106	3.592