High-loaded nickel based sol-gel catalysts for methylcyclohexane dehydrogenation

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HRTEM data

SG_Ni95Cu5-SiO₂

SG_Ni80Cu20-SiO₂
Figure S1. HRTEM images and corresponding EDX data (nickel and copper atomic percentages) for the catalysts after reduction at 400 °C and passivation.
**X-ray diffraction**

**Table S1.** Phase composition and average size of coherent scattering region (CSD size, Å) for the catalysts in oxidized state

| Sample                  | Phase composition | CSD size (Å) |
|-------------------------|-------------------|--------------|
| SG_Ni-SiO₂              | NiO              | 30           |
| SG_Ni₉⁵Cu₅-SiO₂         | NiO CuO          | 30 360       |
| SG_Ni₉₀Cu₁₀-SiO₂        | NiO CuO          | 30 170       |
| SG_Ni₈₀Cu₂₀-SiO₂        | NiO CuO          | 30 260       |
| pCu_Ni₉⁵Cu₅-SiO₂        | NiO CuO          | 37 -         |
| pCu_Ni₉₀Cu₁₀-SiO₂       | NiO CuO          | 40 360       |
| pCu_Ni₈₀Cu₂₀-SiO₂       | NiO CuO          | 35 580       |
| pCu_Ni₇₀Cu₃₀-SiO₂       | NiO CuO          | 250 25 (bimodal) 550 |
Figure S2. Dependence of toluene yield on copper fraction (wt%) in the pCu catalysts and SG_Ni-SiO$_2$ at different temperatures in the methylcyclohexane dehydrogenation. Copper fraction is a percentage of copper relative to the total amount of both metals (nickel and copper).