Supporting Information

Sol-Gel Synthesis for Size and Shape-Controlled Metal Oxide Nanostructures

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Figure S1: Mn$_3$O$_4$ SEM (top), TEM (down) and SAED pattern of manganese oxide nanostructures formed in each different solvent system at the molar ratio of precursor to base 1:10.

Figure S2: Mn$_3$O$_4$ SEM (top), TEM (down) and SAED pattern of manganese oxide nanostructures formed in each different solvent system at the molar ratio of precursor to base 1:15.
Figure S3: Mn$_3$O$_4$ XRD pattern of manganese oxide nanostructures formed in each solvent system at a molar ratio of precursor to base of: (a) 1:10, and (b) 1:15 with the unit cell structure – triclinic.

Figure S4: CuO SEM (top), TEM (down) and SAED pattern of copper oxide nanostructures formed in each different solvent system at the molar ratio of precursor to base 1:10.
Figure S5: CuO SEM (top), TEM (down) and SAED pattern of copper oxide nanostructures formed in each different solvent system at the molar ratio of precursor to base 1:15.

Figure S6: CuO XRD pattern of copper oxide nanostructures formed in each solvent system at a molar ratio of precursor to base of: (a) 1:10, and (b) 1:15 with the unit cell structure - Monoclinic.
Figure S7: Mg(OH)\textsubscript{2} SEM (top), TEM (down) and SAED pattern of magnesium hydroxide nanostructures formed in each different solvent system at the molar ratio of precursor to base 1:10.

Figure S8: Mg(OH)\textsubscript{2} SEM (top), TEM (down) and SAED pattern of magnesium hydroxide nanostructures formed in each different solvent system at the molar ratio of precursor to base 1:15.

Figure S9: Mg(OH)\textsubscript{2} XRD pattern of magnesium hydroxide nanostructures formed in each solvent system at a molar ratio of precursor to base of: (a) 1:10, and (b) 1:15 with the unit cell structure - trigonal.
Figure S10: BHJ desorption average pore diameter distribution graphs of Mn$_3$O$_4$, CuO, and Mg(OH)$_2$ nanostructures prepared at 1:10 molar ratio of the precursor to the base concentration in water and toluene respectively.
Figure S11: The comparison graph of BHJ desorption pore volume distribution with respect to average pore diameter of Mn$_3$O$_4$, CuO, and Mg(OH)$_2$ nanostructures prepared at 1:10 molar ration of the precursor to the base concentration in water and water/toluene respectively.