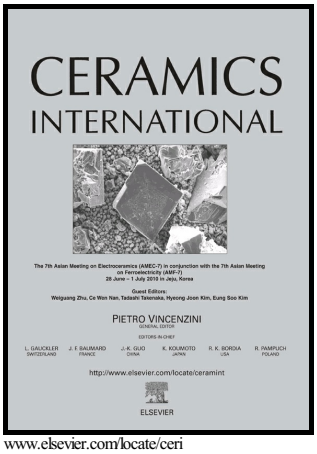

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Effectiveness of Ni Incorporation in Iron Oxide Crystal Structure towards Thermochemical CO_2 Splitting Reaction

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A B S T R A C T

In this study, Ni-doped iron oxide ($Ni_xFe_{3-x}O_4$) materials were synthesized via the 1,2-epoxypropane assisted sol-gel method by varying the molar concentration of Ni from x = 0.2 to 1. Sol-gel derived $Ni_xFe_{3-x}O_4$ gels were dried and the dried powder was further calcined upto 600°C in air for 90 min. Obtained calcined $Ni_xFe_{3-x}O_4$ powders were further analyzed to determine the phase composition, crystallite size, specific surface area, pore volume, and morphology via powder X-ray diffraction (PXRD), BET surface area analysis (BET), as well as scanning and transmission electron microscopy (SEM and TEM). The obtained results in the synthesis and characterization section indicate formation of $Ni_xFe_{3-x}O_4$ nanoparticles with high specific surface area. Thermal reduction and re-oxidation of the sol-gel synthesized $Ni_xFe_{3-x}O_4$ materials were determined by using the high temperature thermogravimetry. Obtained results indicate that the amount of O_2 released during the thermal reduction step (at 1400°C) and