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## Fabrication and microstructure study of aluminum matrix composites reinforced with SiC and $B_4C$ particulates

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In the present paper, aluminum matrix composites were fabricated using base material AA6082-T6. SiC and $B_4C$ particulates were used as reinforcement to obtain hybrid and non-hybrid composites through the conventional stir casting process. AA6082-T6/SiC composites with 5, 10, 15 and 20 wt% of SiC; AA6082-T6/$B_4C$ composites with 5, 10, 15 and 20 wt% of $B_4C$ and AA6082-T6/(SiC+$B_4C$) hybrid composites with 5, 10, 15 and 20 wt% of (SiC+$B_4C$) taking equal fraction of SiC and $B_4C$ were made and the microstructure study was carried out. X-ray diffraction (XRD) patterns revealed the presence of reinforcement within the matrix along with some other compounds. The microstructure of the fabricated composites was examined with the help of scanning electron microscope (SEM) and the micrographs revealed that the dispersion of reinforced particles was reasonably uniform at all weight percentages.

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## Solution combustion synthesis of Mn-based perovskite oxides: A future challenge for catalytic applications

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Development of catalyst with high and thermally stable activity is the major challenge of the progressed researches interesting in reducing environmental pollution. Perovskite oxides with Mn in the B-sublattice present exceptional catalytic properties compared to other transition metal based perovskites and some noble metal-based catalysts. Controlling morphology and texture of Mn-containing catalyst is greatly related to the synthesis methods. Developed studies revealed the efficiency of solution-based methods to lower duration and temperature of the conventional synthesis and hence improving textural properties of the catalyst. Recently, researchers are converted to study the so-called solution combustion synthesis (SCS). This simple, rapid and energy saving technique proved to be useful in the preparation of nano scaled materials through a single and self-sustained exothermic reaction between a suitable organic fuel and oxidizers (metallic nitrates). In the present work, we are interested on the SCS preparation of different Mn-containing perovskite oxides active in low (ethanol) and high (methane) temperature oxidation reaction. Among the numerous fuel molecules, the use of glycine in a stoichiometric ratio to nitrates leads to reduce content of carbonates species and increase surface Mn concentration which explain the increase of catalytic activity and thermal stability. The SCS method has been also successfully used for the preparation of substituted La1-xAxMn1-yByO3+δ. The single perovskite lattice was obtained in a large substitution level ($0 \le x \le 1$; $0 \le y < 1$) when using trivalent cations ($Eu^{3+}$, $Pr^{3+}$) in La site or $Al^{3+}$ in Mn sublattice, while a supplementary calcinations step was needed after incorporation of lower cations ($Ca^{2+}$, and $K^{+}$). Generally, low substitution level (10-20%) in A or B sublattice are favorable for enhancing catalytic activity in methane deep oxidation in relation to the improvement of Mn reducibility, oxygen desorption and $Mn^{4+}/Mn^{3+}$ surface ratio. The SCS was also proved to be efficient in the preparation of supported lanthanum manganite on Yttrium stabilized zirconia in cubic symmetry (YSZ). Compared to pure manganite, the supported one has larger surface area and showed better specific activity and thermal stability.

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