

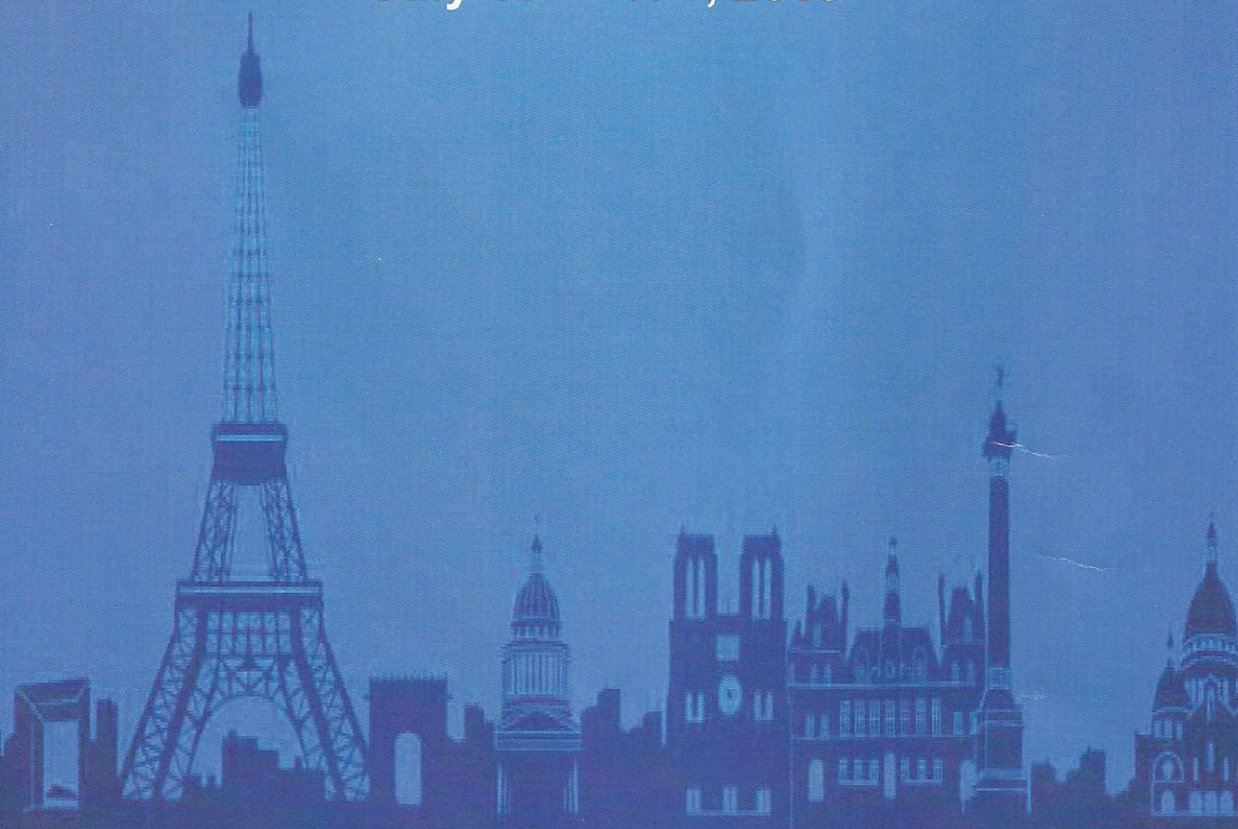
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# **BOOK OF ABSTRACTS**

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## Synthesis of Carbon Nanostructures Reinforced Al6061 by Mechanical Milling and Sintering

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Aluminum-based Metal Matrix Composites with small amount of nanometer-range discontinuous hard phases as reinforcements have attracted considerable research interest in recent years due to the potential for the development of novel composites with unique mechanical and physical properties [1]. Aluminum 6061-based metal matrix composites are popular because of their low density and high specific stiffness. Graphitic structures materials such as graphite, graphene, fullerenes and carbon nanotubes are effective reinforcements for structural applications due to their exceptional mechanical properties and tribological behavior.

In the present work, 6061 aluminum alloy was used as the matrix phase and graphite, fullerenes and carbon nanotubes as reinforcing materials. Mechanical milling was performed using a SPEX 8000 ball milling machine to disperse the carbon materials into the Al6061 matrix. Milling times and carbon materials concentration were varied. The as-milled powders were consolidated by conventional sintering. Scanning and transmission electron microscopies, X-ray diffraction, Raman spectroscopy and hardness tests were used to analyze the composites obtained.

The 6061 aluminum alloy was successfully reinforced by the dispersion of carbon materials through milling process. The presence of phases produced by the reaction between Al and carbon during the sintering stage was detected. Mechanical bonds between Al and carbon materials were identified, which suggests a good load transfer from the Al matrix to the carbon reinforcement phase. The composites showed an increase in mechanical properties in relation with the unreinforced alloy produced by the same route.

[1] C. Suryanarayana, Nasser Al-Aqeeli, Prog. Mater. Sci. 58 (2013) 383-512.

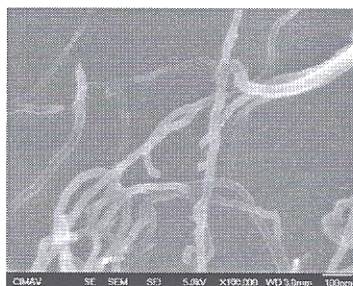


Fig. 1. Secondary electron SEM micrograph of CNTs used for the