GROWTH OF HYBRID CARBON-BASED NANOSTRUCTURES VIA CHEMICAL VAPOR DEPOSITION

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ABSTRACT

Carbon, as one of the most abundant elements of the universe, exists in many allotropic forms, depending on the atomic arrangements and types of bonding such as graphite and diamond. However, carbon can also be synthesized in a controlled lab environment producing carbon nanomaterials with remarkable properties [1-2]. In the past few years, Chemical Vapor Deposition (CVD) has been proved one of the most prominent method in producing carbon nanomaterials. Compared with other techniques, it shows advantages such as easy operation, low production costs, high yielding of the synthesized materials and potential scalability for mass production. Parameters such as different types of catalysts, substrates, hydrocarbon precursors as well as reaction time and applied temperature can lead to different morphologies of carbon nanomaterials [2-3]. The purpose of this study is to investigate the growth of hybrid nanostructures via chemical vapor deposition using half – Heusler alloys as catalysts at two different substrates, silicon wafer and ceramic boats. In both cases, the supported catalyst method was applied, which means that the catalyst was deposited on the substrate before being placed in the furnace. The aim of the hybrid half – Heusler / carbon nanostructures materials is to display thermoelectrical properties for use in polymeric thermoelectric provisions. The growth conditions, such as the existence of additional gases (i.e. hydrogen), reaction time and the nature of substrate, were considered for this study characterization and the obtained structure were characterized by Scanning Electron Microscopy, Transmission Electron Microscopy and Raman spectroscopy.

KEYWORDS: Chemical vapor deposition, half – Heusler alloys, Catalyst, Nanostructures

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Acknowledgments: This research was supported by the Horizon 2020 European Research program "**FAST – SMART:** Fast and Nano-Enabled Smart Materials, Structures and Systems for Energy Harvesting" (GA No: 862289)