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優勝作品專輯(國外作品)

作品編號	**140044**
參展科別	**物理與太空科學科**
作品名稱	**Carbon Nanostructures Via Dry Fce Exposed to High Temperature**
得獎獎項	**二等獎**

國　　家	United States
就讀學校	Isaac Bear Early College
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ABSTRACT OF EXHIBIT
TAIWAN INTERNATIONAL SCIENCE FAIR

This science project is designed to answer a question of whether or not a chemical reaction is needed to produce industrial quantities of carbon nanostructures by exposing dry ice to a high temperature that is at least 3100℃. A small carbon arc furnace powered by an electric welder is used to produce the high temperature. During control runs, the carbon arc furnace is energized for a predetermined time, after which the carbon arc furnace is de-energized and any carbon particles within the furnace are collected. During carbon nanostructures synthesis runs, dry ice is placed within the carbon arc furnace. The carbon arc furnace is energized and the dry ice is consumed for the predetermined time. Carbon nanostructures synthesized during the synthesis runs are collected once the carbon arc furnace is de-energized and allowed to cool. The volume of the carbon particles collected during the control runs is compared to the volume of the carbon nanostructures produced by the synthesis runs. This science project has discovered that on average at least 16 times more carbon nanostructures are produced during synthesis runs consuming dry ice as opposed to the control runs. Moreover, the synthesis runs did not rely on chemical reactions. Further still, samples of the synthesized carbon nanostructures were imaged using a transmission electron microscope (TEM). The TEM images clearly show high-quality carbon nanostructures that include carbon nanotubes, faceted carbon nanospheres, and the super-material graphene.

評語

This project shows a very convenient and useful device to produce carbon nano material. The idea is neat and the design is simple and effective. Although the idea of producing the carbon nano material was already proposed and proved by other people, the author can design a device which is effective in efficiency and cost. We are pleased to see that the author can convert the idea into reality and the device is applicable in industry. We congratulate the author for such a wonderful project and recommend this project without reservation.