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## BOOK OF ABSTRACTS



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## Synthesis of Carbon Nanotubes by Laser Ablation Method

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Laser ablation of graphite is a well-known method for obtaining a wide variety of carbon allotropes, such as diamond-like carbon thin films, fullerene carbon molecules, carbon nanowalls, carbon nanotubes etc. Pulsed laser vaporization of graphite target containing Co/Ni or Rh/Pd nanoparticle as catalysts is proved to result in synthesis of high quality carbon nanotubes. In this paper the results of synthesis of carbon nanotubes (CNT) using a nanosecond pulsed Nd-YAG laser is presented.

The reactor for synthesis of carbon nanotubes assembled in the Institute of Fundamental Technological Research is shown in Fig.1. The ablation of the target occurs in a background gas – argon at a pressure of 660 Pa slowly flowing ( $\sim 5$  mm/s) in a quartz tube 25 mm in diameter inserted in an outer 50 mm tube. The outer quartz tube is mounted inside a cylindrical furnace operating at 1000°C. The target is situated in the centre of the furnace. Graphite target irradiation was performed by double pulse Nd:YAG laser specially manufactured by Ekspla. The laser was operated either at a wavelength of 1064 nm or 355 nm with fluence about  $2 \text{ J cm}^{-2}$  and 10 ns pulse duration with a repetition rate of 10 Hz. The second pulse was delayed by 30 ns. The target was cold pressed from graphite powder containing cobalt and nickel nanoparticles as carbon nanotubes catalysts. The carbon soot containing nanotubes was collected from the surface of the brass water-cooled collector located at the exit of the furnace. Fig.2 shows the TEM image of the collected soot with carbon nanotubes.

The effect of the laser wavelength on CNT properties was studied including the production rate and purity, the diameter and chiral angle distributions and nanotube type populations. Analysis was made by means of TEM images, photoluminescence, absorption and Raman spectroscopy.

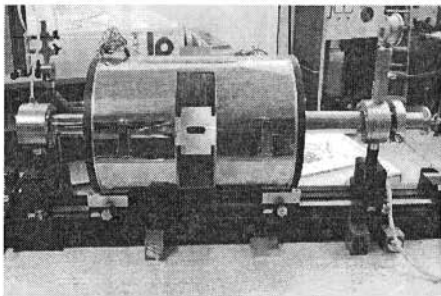


Fig. 1: Reactor for synthesis of carbon nanotubes

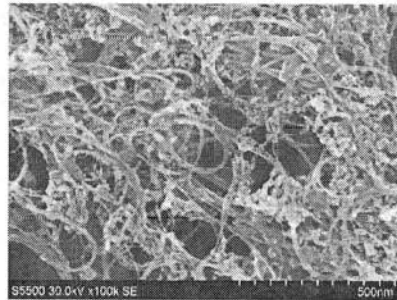


Fig. 2: TEM image of carbon soot containing nanotubes