

Synthesis of carbon nanotubes for acetylene detection

ABSTRACT

A gas sensor, utilizing carbon nanotubes (CNTs) in a pellet form for acetylene detection has been developed. This research was carried out to investigate the absorption effect of acetylene (C_2H_2) towards the change of resistance of carbon nanotubes pellet as sensor signal. Source Measurement Unit (SMU) was used to study the gas sensing behaviour of resistance based sensors employing carbon nanotubes pellet as the active sensing element. Studies revealed that the absorption of acetylene into the carbon nanotubes pellet resulting in increase in pellet resistance. The changes are attributed to p-type conductivity in semiconducting carbon nanotubes. Carbon nanotubes used in this research was synthesized by means of Floating Catalyst Chemical Vapor Deposition (FCCVD) method. Benzene was used as a hydrocarbon source while ferrocene as a source of catalyst with Hydrogen and Argon as carrier and purge gas respectively. From the research, it was shown that carbon nanotubes show high sensitivity towards acetylene. The highest sensitivity recorded was 1.21, 1.16 and 17.86 for S1, S2 and S3 respectively. It is expected that many applications of CNT-based sensors will be explored in future as the interest of the nanotechnology research in this field increases.

Keyword: Carbon nanotubes; Acetylene sensor