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**Eco-friendly and high yield synthesis of graphene and its application for polymer-graphene composite coatings**

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Graphene-polymer composite coatings show excellent coating properties such as corrosion resistance, high mechanical properties, anti-ststic effect and also reasonably good UV blocking. Two types of coatings were made: sol-gel functionalized pre-treated graphene on metals which showed water permeation rate almost an order of magnitude lower than that of a silane coating of same thickness. The second coating was graphene dispersed in epoxy which creates an epoxy primer which is twice as corrosion resistant as Inorganic Zinc Silicate primer and almost 10 times more effective than the well-known epoxy zinc rich coatings. In order to use graphene for such application, one requires graphene in powder form and thus there was need to find out a cost effective, eco-

friendly synthesis method of graphene. We looked into the feasibility of various methods to form powders. Graphene by oxidation method, though gives good yield is impure. Exfoliation method gives very low yield. We therefore created a special exfoliation method known as Pressure Exfoliation method, where we separate various layer of graphene from powder graphite using high pressure. The yield of this method is close to 20%. The graphene formed is a purest form of graphene with 3-4 layer thick. It is defect free graphene as confirmed by detailed Raman Spectroscopy. The details of graphene structure (TEM), Electron diffraction pattern layer structure and Raman spectrograph is shown below.

**Biography**

A.S. Khanna has worked for 27 years in Materials Science Department, Indian Institute of Technology, Bombay, India with long experience in Surface Engineering. He has guided 27 PhD, 115 Master's projects and about 25 BTech projects. He has received several Awards. He is Fellow ASM International and NACE International, Life member of Indian Institute of Metals and Society for Electrochemical Science. He is a founder Chairman of SSPC India. He is a fellow of Humboldt Foundation Bonn and also of Royal Norwegian Science and Technology and Fellow of Japan Key Centre. He has done Postdoctoral work at France, Germany and Japan. He has written three books, two on high temperature Corrosion and one on High Performance organic coatings.

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