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High corrosion resistance offered by multi-walled carbon nanotubes directly grown over mild steel substrate

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Several synthesis methods such as plasma enhanced, laser ablation, catalytic or thermal chemical vapour deposition, electric arc discharge have been explored for production of high quality carbon nanotubes of different diameters and lengths. Of these catalytic chemical vapour deposition has been proven to produce high quality and large scale CNTs at lower cost. In this paper, a uniform coating of multi-walled carbon nanotubes was directly formed over a steel substrate at 800 degrees by decomposition of ferrocene-benzene mixture which was kept inside a chemical vapour deposition setup. The nanotubes formed over the substrate were characterized using scanning electron microscopy and transmission electron microscopy techniques. Corrosion behavior of the bare and MWCNT coated mild steel substrate was examined through potentiodynamic polarization method. A significant increase in the corrosion resistance was noted with carbon nanotubes coating over the steel plate.

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