Metal Octacarboxy phthalocyanines / Multiwalled carbon nanotubes hybrid for the development of Dye Solar Cells

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INTRODUCTION

Dye solar cell (DSC) has become one of the attractive devices for the conversion of solar energy into electricity worldwide, because of their remarkable properties such as low cost, non-toxicity and easy to fabricate as compared to other photovoltaic cells [1]. In these devices, photosensitisers are one of the main components for light-driven processes. Metallophthalocyanine (MPc) complexes, especially those containing diamagnetic metal centres (M = Zn, Ga, Si), are well established as efficient photosensitisers [2]. However, the use of metal phthalocyanine (MPc) complexes in DSCs is rarely reported. In addition, carbon nanotubes (CNTs) are known for their unique physicochemical properties [3]. CNTs are efficient catalysts and conducting species. CNTs are thought to enhance the photosensitisation properties of MPc complexes

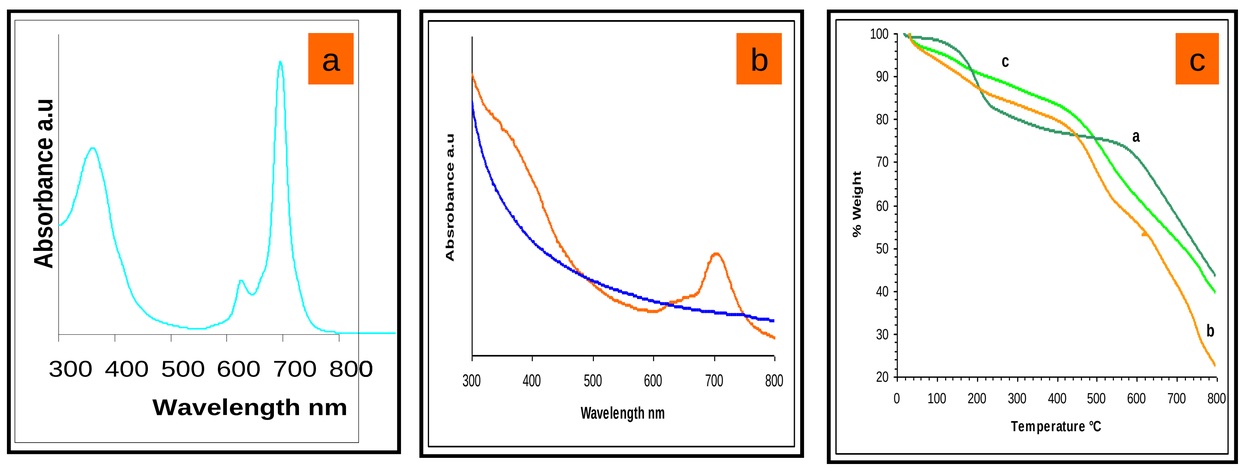
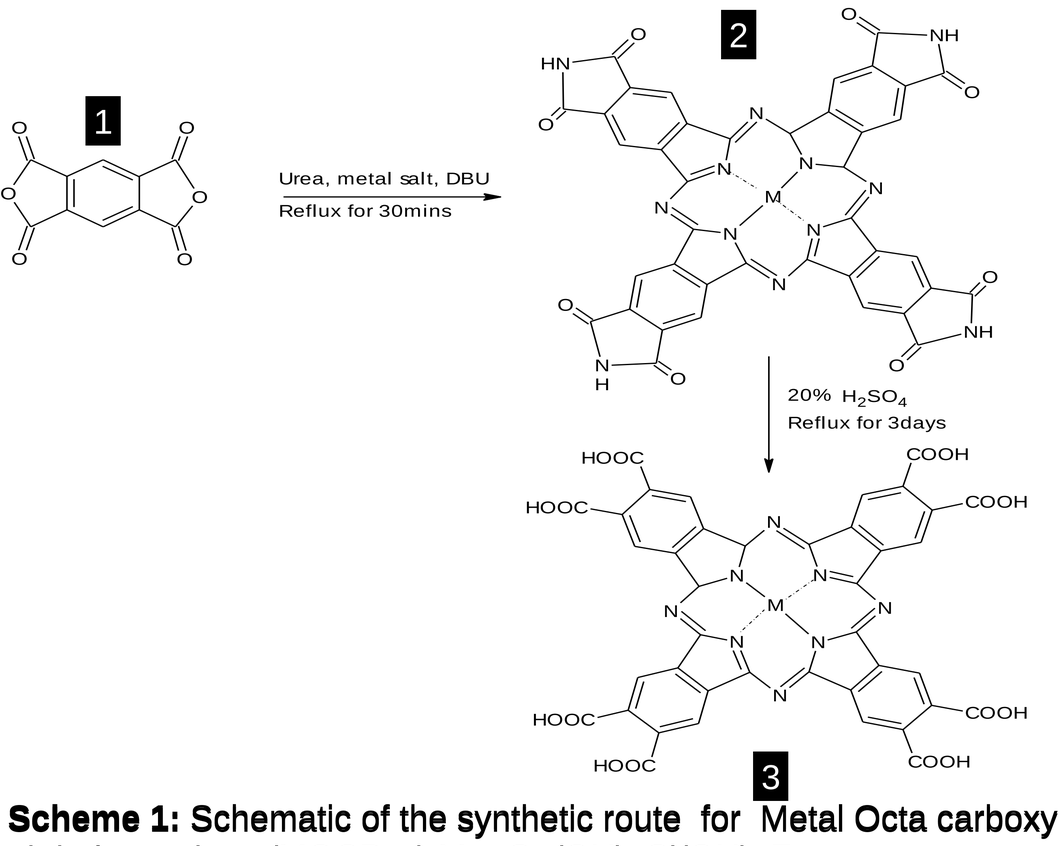


Figure 1: Absorption spectra **a.** MOCPcs **b.** MOCPcs : MWCNTs –NH2 adsorbed In DMF
c. TGA profiles of a. MWCNTs – NH2, b. MOCPcs, c. MOCPcs:MWCNTs-NH2 (10 °C min -1 under N2

EXPERIMENTAL METHODS



Scheme 1: Schematic of the synthetic route for Metal Octa carboxy phthalocyanines (MOCPcs) M = Ga(OH), Si(OH), Zn

Formation of MOCPC:MWCNT- Adsorbed

Amine – functionalised MWCNTS were sonicated in dry DMF (10 ml) for 15min to give a dark suspension. Complex 3 was then added and the mixture was stirred for 5hrs until the green colour had faded. The solid product was filtered and washed several times with DMF to give the adsorbed species : MOCPcs (3) : MWCNT-adsorbed

RESULTS AND DISCUSSION

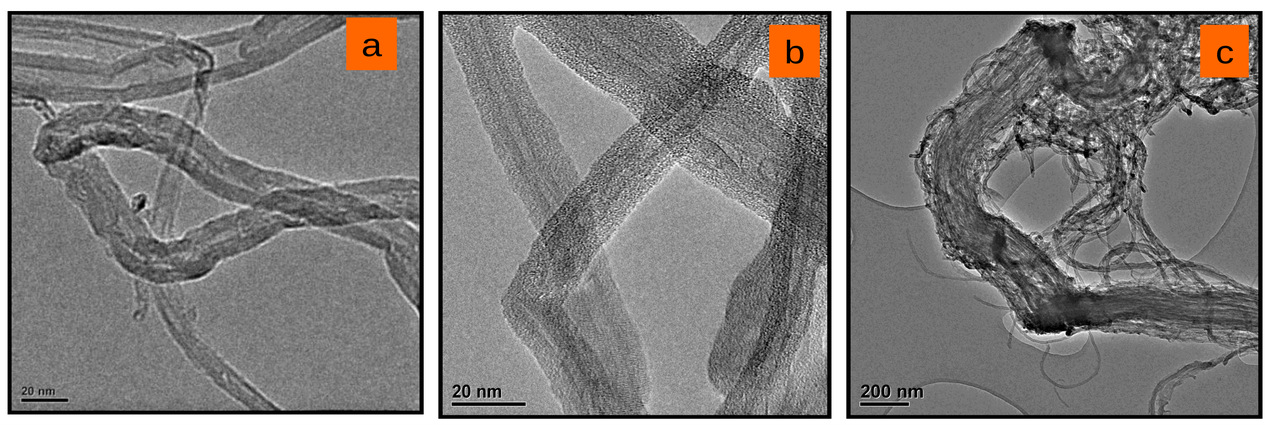


Figure 2: TEM images of **a.** Untreated MWCNTs **b**. MWCNTs – NH2 **c**. MOCPcs : MWCNTs – NH2

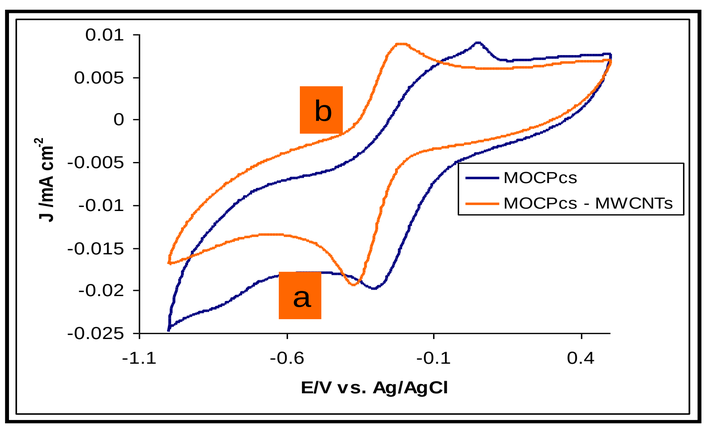


Figure 3: Cyclic voltammograms of **a.** MOCPcs **b.** MOCPcs : MWCNTs hybrid in dry DMF With 0.1 M TBAP, scan rate : 50 mV

CONCLUSION

•MOCPcs and its hybrid (MOCPcs – MWCNT – NH2) with MWCNT – NH2 were Successfully carried out as judged by the satisfactory characterisation using techniques such as FTIR, UV-Vis spectroscopes.
•The cyclic voltammogram shows that the oxidation reactions are electrochemically Irreversible due to the central metal present while the reduction reactions are Reversible for the phthalocyanine ring with or without MWCNT.

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