Catalyst-free synthesis of carbon nanospheres for potential biomedical applications: waste to wealth approach

Shoriya Aruni Abdul Manaf, a Partha Roy, b Korada V. Sharma, c Zainab Ngaini, d Victor Malgras, e Ali Aldalbahi, f Saad M. Alshehri, f Yusuke Yamauchi e and Gurumurthy Hegde ag

a Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang, 26300 Gambang, Kuantan, Malaysia. E-mail: murthyhegde@gmail.com
b Faculty of Engineering Technology, Universiti Malaysia Pahang, 26300 Gambang, Kuantan, Malaysia
c Department of Mechanical Engineering, Faculty of Engineering, University Technology PETRONAS, Bandar Seri Iskandar, 31750, Tronoh, Perak, Malaysia
d Department of Chemistry, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Sarawak, Malaysia
e World Premier International (WPI) Research Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS), 1-1 Namiki, Tsukuba, Ibaraki 305-0044, Japan
f Department of Chemistry, College of Science, King Saud University, Riyadh 11451, Saudi Arabia

g BMS R and D Centre, BMSCE, Bull Temple Road, 560019 Bangalore, India

Abstract

A single step and simple pyrolysis technique is used to prepare carbon nanospheres (CNSs) from natural bio waste sago hampas in a nitrogen atmosphere without any catalyst. Scanning electron microscope (SEM) images along with transmission electron microscope (TEM) images show evidence of high quality CNSs with a good particle size uniformity. Both X-ray diffraction (XRD) and Raman data show the presence of graphitic characteristic peaks of CNSs. Zeta-potential study reveals that the obtained CNSs can be well dispersed in solution making them suitable for cell imaging applications. The use of biowaste sago hampas is very important from the viewpoint of sustainable synthesis of functional CNSs for the future.

DOI: 10.1039/c4ra14693j