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# Synthesis And Characterization Of Graphene Oxide –Polyoxometalate Composite Material For Device Applications

Khandoji Chetan<sup>a</sup>, Sterin N. S.<sup>a</sup>, M. N. Satyanarayan<sup>a</sup>, Debaprasad Shee<sup>b</sup>, Partha P. Das<sup>\*a</sup>, Sib Sankar Mal<sup>\*c</sup>

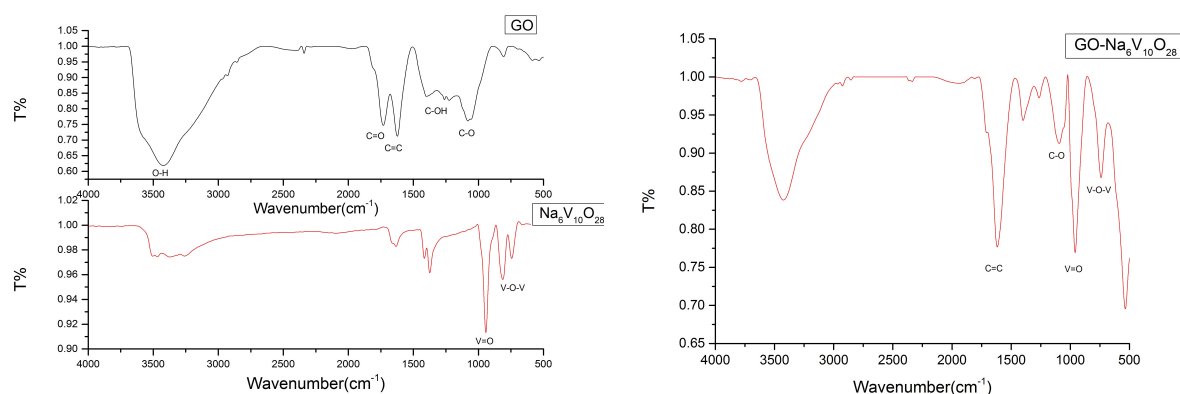
<sup>a</sup> Department of Physics, National Institute of Technology Karnataka (NITK), Surathkal, Mangalore, Karnataka- 575025.

<sup>b</sup> Department of Chemical Engineering, Indian Institute of Technology Hyderabad (IITH), Kandi, Sangareddy, Telangana- 502 285.

<sup>c</sup> Department of Chemistry, National Institute of Technology Karnataka (NITK), Surathkal, Mangalore, Karnataka- 575025.

Correspondence: [daspm@nitk.edu.in](mailto:daspm@nitk.edu.in); [malss@nitk.edu.in](mailto:malss@nitk.edu.in).

Polyoxometalates (POMs) consisting of clusters of d-block transition metals and oxygen atoms represent an important class of water soluble polynuclear nanomaterial. The tuneable size, structure and elemental composition of POM draws considerable attention for the development of functional composite materials of desired chemical and electronic properties.<sup>[1]</sup> Graphene can be the promising support for POMs due to its low band gap energy and fast electron transport properties. These properties of grapheme facilitates transport of electrons of POMs rapidly and effectively.<sup>[2]</sup> In the present investigation, graphene oxide (GO) and reduced graphene oxide (rGO) have been used as a support for POM-graphene composites for semiconductor, hydrogen production applications.<sup>[2]</sup> The deposition of POM on graphene oxide sheets were carried out through electron transfer interaction and electrostatic interaction between POM and GO sheets. The interaction between polyoxometalate and the GO sheet was confirmed using various characterization techniques such as FTIR, Raman spectroscopy, UV-vis spectroscopy, powder XRD, SEM, and TEM. Detailed characterization results confirmed deposition of POM cluster on graphene. The POM-graphene composite were explored as active materials for memory device applications.



**Figure:** FT-IR spectrum of GO, Na<sub>6</sub>V<sub>10</sub>O<sub>28</sub> and GO- Na<sub>6</sub>V<sub>10</sub>O<sub>28</sub>

References: [1] Jean-Philippe Tessonier, Structure Stability and Electronic Interactions of Polyoxometalates on Functionalized Graphene Sheets, *Langmuir*, 2013, 29 (1), pp 393–402. [2] Dan Xu, The assembly of vanadium (IV)-substituted Keggin type polyoxometalate/graphene nanocomposite and its application in photovoltaic system, *J. Mater. Chem. A*, 2015, 3, 10174–10178.