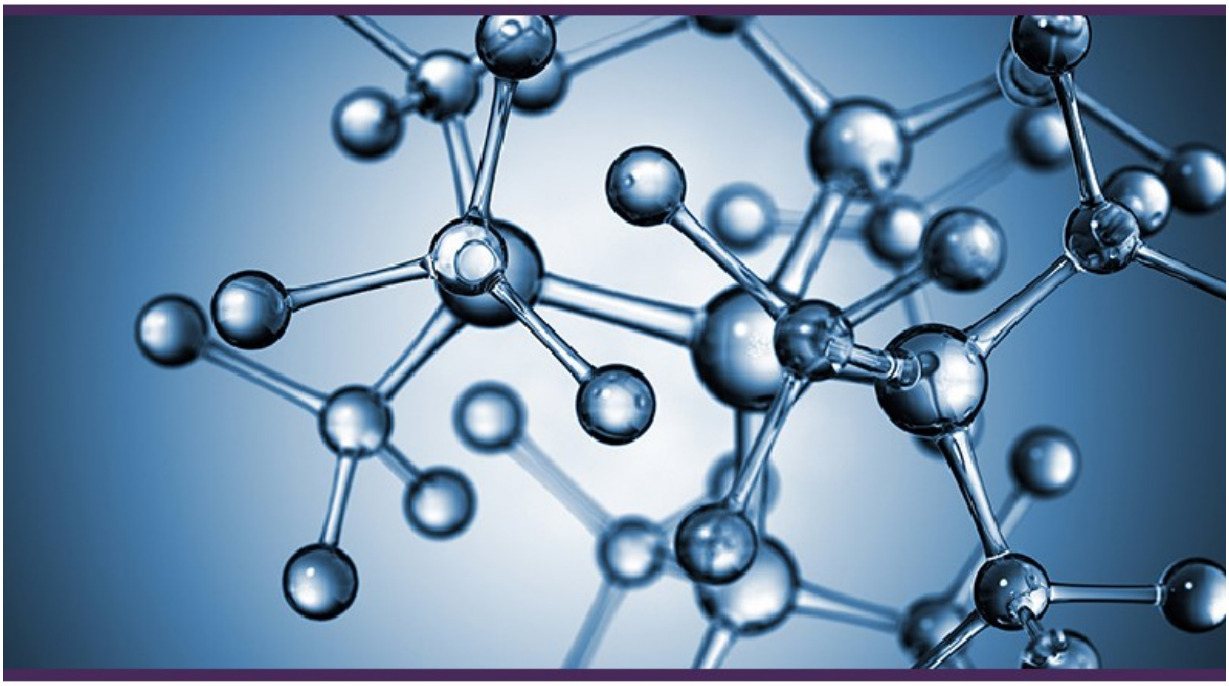
Coalesce Research Group

3rd International Webinar on

MATERIAL SCIENCE AND NANOTECHNOLOGY

September 16-17, 2021 | 13:00 British Time



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NATURAL VEIN GRAPHITE AS A PROMISING CANDIDATE FOR THE ANODE APPLICATION IN A RANGE OF RECHARGEABLE BATTERIES

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Abstract

The high crystallinity, high purity (95-99 %), and extensive mineralization of natural Vein Graphite (VG) make it unique among the graphite sources. The National Center for Advanced Battery Research (NCABR) attached to the National Institute of Fundamental Studies in Sri Lanka, has successfully developed low-cost, more environmentally friendly chemical techniques to purify and modify VG aiming for the anode application, specially in the rechargeable Lithium-Ion Battery. For that, techniques based on acid leaching, acid digestion, and alkali roasting methods have been developed for the purification of VG over 99.9% carbon content. For the surface modification, mild oxidation, coating with carbonates, acid digestion, and microwave irradiation techniques have also been introduced. The VG developed through these developed processes were fabricated into thin electrodes and they showed very promising performance in Li-ion coin cells resulting a discharge capacity in the range between 350 mAh/g and 450 mAh/g with enhanced electrochemical performance over 150 cycles with 99.9% Coulombic efficiency. Further, scaling-up and optimization of these developed purification and modification techniques are presently underway. In addition, the NCABR has been involved with developing VG, through various thermal and chemical processes, for the anode application in Na-ion and Mg-ion based rechargeable batteries. Under that, structurally modified VG, such as Graphite Intercalation Compounds (GIC) prepared with chromium and Graphene Oxide (GO) prepared by thermal reduction, revealed promising performances for Na-ion rechargeable batteries. Altogether, our R&D efforts have already revealed the promising nature of VG for the anode application in a range of rechargeable batteries.

Acknowledgement: The financial assistance by the General Treasury under a cabinet paper of the Government of Sri Lanka (No: 17/1907/16/038 on 2017-08-09) is highly acknowledged.

Biography

Himashee Naranpanawa is a postgraduate researcher attached to the National Center for Advanced Battery Research (NCABR) of National Institute of Fundamental Studies, Kandy, Sri Lanka. She received her B.Sc. in Mineral Resources and Technology specializing Mineral Processing Technology from the Uva Wellassa University of Sri Lanka in 2017 and currently reading for the M.Phil. Degree from the University of Peradeniya, Sri Lanka. Her research work focuses mainly on purification/modification aspects of natural vein graphite with special attention on scaling- up/optimization, for the anode application in rechargeable batteries.