Advanced Core for Energetics, Hiroshima University Vol. 31

HU-ACE NEWS LETTER

Vol.31
2019.7

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Activities of the Core

Jul. 1, 2019	Assoc. Professor, Singh joined HU-ACE
Jul. 8-10, 2019	The 3rd International Symposium on Fuels and Energy (ISFE2019)
Jul. 18, 2019	The 76th Hiroshima University Biomass Evening Seminar (co-organization)
Jul. 25, 2019	The 35th HU-ACE Steering Committee Meeting
Jul. 27, 2019	Kids Energy Symposium 2019 (co-organization)

The 3rd International Symposium on Fuels and Energy (ISFE2019)

The 3rd International Symposium on Fuels and Energy (ISFE2019), an International Symposium organized by HU-ACE, was held in Higashi-Hiroshima City on July 8-10. There were totally 81 participants joining the ISFE2019. There were invited talks, oral presentations and poster presentations. All were activity discussed in English. There was a technical tour to J-Power Takehara Coal-fired Thermal Power Stations and AOHATA Fruits Jam Factory. Next year, we will provide an opportunity for researchers to exchange opinions in this field.

Issued by Advanced Core for Energetics, Hiroshima University

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HU-ACE NEWS LETTER
Advanced Core for Energetics, Hiroshima University Vol. 31
Member Introduction No. 23

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Research field: Material Science

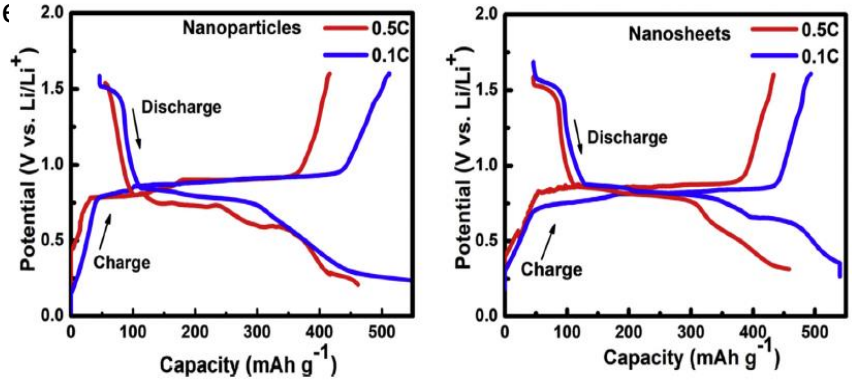
Keyword: Energy Storage/Topological Insulators/Photocatalysis

Abstract

Background Search for an alternative fuel is essential due to the fast exhaust of fossil fuels and their hazardous byproducts. Lithium-ion batteries (LIBs) are the excellent solution for the electrochemical power devices due to their higher volumetric and gravimetric charge capacity. Layered anode materials provide higher storage capacity in contrast to the carbon based anode materials. Approach towards the investigation of all-solid-state LIBs using Bi_2Te_3 anode material is taken.

Methods All solid state LIBs are the batteries having electrode and electrolytes in solid form, which provide prevention from explosion caused by the organic liquid electrolyte. Bismuth Telluride (Bi_2Te_3) as an anode material was chosen due to its layered structure consisting quintuple layers stacked by weak Vander Waal forces. Nanostructured Bi_2Te_3 provides higher surface area for higher Li storage compared to the bulk. Chemical approach for synthesis of two different nanostructures was taken due to its simple and inexpensive way. Their structure, morphology, elemental compositions, electrochemical measurements were taken into account for battery testing.

Results Electrochemical performance of all solid state LIB using Bi_2Te_3 nanostructures as a anode material at different current density rate is shown in figure. For nanoparticles, the first discharge capacity was found 550 mAh^{-1} and the charging capacity 512 $mAhg^{-1}$ in which the Columbic efficiency was found to be 93%. For nanosheets, the discharge capacity is 539.6 $mAhg^{-1}$ with the charge capacity of 455 mAh^{-1} suggests the Coulombic e
It is noted that this obtained capacity is higher than Bi_2Te_3 anodes used with liquid elect -rolyte. This Work provides the new pathway for *Bi* based chalcogenide nanostructures as anode and $LiBH_4$ as solid state electrolyte as promising candidates for application in next generation high-performance LIBs.



References

Rini Singh et al. $LiBH_4$ as solid electrolyte for Li-ion batteries with Bi_2Te_3 nanostructured anode, Int. J. Hydrogen Energy, 43 (2018) 21709-21714