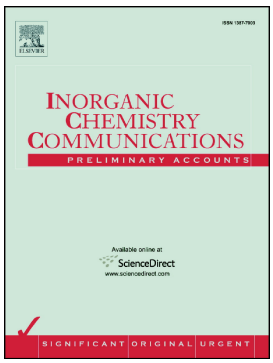

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PII: S1387-7003(18)30120-5
DOI: doi:10.1016/j.inoche.2018.03.003
Reference: INOCHE 6907

To appear in: *Inorganic Chemistry Communications*

Received date: 6 February 2018
Revised date: 4 March 2018
Accepted date: 9 March 2018

Please cite this article as: Jipeng Tan, Fa-Nian Shi, Fang Hu, Gui-Mei Shi, Bo Tian, Hongpeng You , Synthesis, crystal structure of a lithium - zinc bimetal coordination polymer and its graphene composite as anode materials for lithium ion battery. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Inoche(2017), doi:10.1016/j.inoche.2018.03.003

Synthesis, crystal structure of a lithium - zinc bimetal coordination polymer and its graphene composite as anode materials for lithium ion battery

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Abstract: A new bimetal coordination polymer composed of Li^+, Zn^{2+} and 4,5-imidazole dicarboxylic acid (idca) with a molecular formula of $Li_5Zn_6C_{25}H_{11}N_{10}O_{24}$ (LiZn1) was prepared via a simple hydrothermal method. The single crystal structure shows that LiZn1 has a 3-D framework consisting of three independent four coordinated Li^+ and three independent five coordinated Zn^{2+} cations, respectively. Topological study indicates the network of LiZn1 is 9-nodal, 3,3,3,3,3,4,5,5,6-connected net, with a point symbol of $\{4.6.7\}_2\{4.6^2\}_4\{4^2.6^2.7^2.9^3.11\}\{4^2.6\}_2\{4^3.6^3.7^2.8^5.9^2\}_2\{4^3.6^3\}_2\{6^2.8\}\{6^5.7^2.8.9^2\}_2$. The graphene composite (LiZn1/gr) was prepared via a sonication treatment of the mixture of LiZn1 and graphene. LiZn1 was employed as the anode of a lithium ion battery, the initial discharge capacity was obtained for 558 mAh/g, after 100 cycles the discharge capacity was decreased to around 75 mAh/g. However, the graphene composite (LiZn1/gr) has improved very much the performance with the initial discharge capacity of 1090 mAh/g and after 100 cycles the discharge capacity could remain about 133 mAh/g.

Keywords: Lithium; Zinc; Coordination polymer; Lithium ion battery; Capacity; Anode material