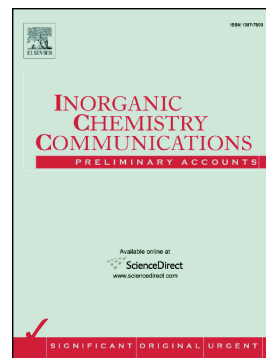


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## Synthesis, crystal structure of a lithium - zinc bimetal coordination polymer and its graphene composite as anode materials for lithium ion battery

Jipeng Tan,<sup>1</sup> Fa-Nian Shi,<sup>\*1</sup> Fang Hu,<sup>2</sup> Gui-Mei Shi,<sup>1</sup> Bo Tian<sup>\*1</sup> and Hongpeng You<sup>3</sup>

<sup>1</sup>School of Science, Shenyang University of Technology, Shenyang 110870, P.R. China.

<sup>2</sup>School of Materials Science and Engineering, Shenyang University of Technology.

<sup>3</sup>State Key Laboratory of Rare Earth Resource Utilization, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, P.R. China.

\*E-mail: shifn@sut.edu.cn; tian-harry@foxmail.com

**Abstract:** A new bimetal coordination polymer composed of Li<sup>+</sup>, Zn<sup>2+</sup> and 4,5-imidazole dicarboxylic acid (idca) with a molecular formula of Li<sub>5</sub>Zn<sub>6</sub>C<sub>25</sub>H<sub>11</sub>N<sub>10</sub>O<sub>24</sub> (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<sup>+</sup> and three independent five coordinated Zn<sup>2+</sup> 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}<sub>2</sub>{4.6<sup>2</sup>}<sub>4</sub>{4<sup>2</sup>.6<sup>2</sup>.7<sup>2</sup>.9<sup>3</sup>.11}{4<sup>2</sup>.6}<sub>2</sub>{4<sup>3</sup>.6<sup>3</sup>.7<sup>2</sup>.8<sup>5</sup>.9<sup>2</sup>}<sub>2</sub>{4<sup>3</sup>.6<sup>3</sup>}<sub>2</sub>{6<sup>2</sup>.8}{6<sup>5</sup>.7<sup>2</sup>.8.9<sup>2</sup>}<sub>2</sub>. 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

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