### Edge-Enriched Graphitic Anodes by KOH Activation for Higher Rate Capability Lithium Ion Batteries

D. Zakhidov<sup>1, 2</sup>, R. Sugamata<sup>3</sup>, T. Yasue<sup>3</sup>, T. Hayashi<sup>3</sup>, Y. A. Kim<sup>3</sup>, M. Endo<sup>4</sup>

<sup>1</sup>Department of Chemistry, Rice University, Houston, Texas, USA <sup>2</sup>NanoJapan Program, Rice University, Houston, Texas, USA <sup>3</sup>Department of Engineering, Shinshu University, Nagano, Japan <sup>4</sup>Research Center for Exotic Nanocarbons (JST), Shinshu University, Nagano, Japan

Natural graphite is the most commercially successful anode for lithium ion batteries due to its low cost, safety, and ease of fabrication, but higher rate capabilities are needed for faster charging and discharging cycles in next generation technologies. In this work, ball-milled graphite was chemically activated by varying weight percentages of KOH in order to increase the number of active edges sites. The effects of KOH activation on graphite morphology were investigated by N<sub>2</sub> adsorption isotherms (BET), XRD, SEM, RAMAN, and TEM. BET calculations showed an increase in surface area with increasing weight percentages of KOH activation. XRD and TEM data prove that the crystallinity of graphite was maintained despite activation effects. The rate capabilities of graphite anodes are expected to surpass conventional graphite anodes due to larger number of edges for lithium ion intercalation.





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<sup>1</sup>Department of Chemistry, Rice University <sup>2</sup>NanoJapan Program, Rice University <sup>3</sup>Department of Engineering, Shinshu University, Japan <sup>4</sup>Research Center for Exotic Nanocarbons, Shinshu University, Japan

## Motivation

### **Lithium Ion Battery**

- Edges make the main contribution to the electronic and chemical properties in carbon materials
- Graphite is the most commercially successful anode for lithium ion batteries



### **Objective:** Increase the number of active edges in graphite by KOH activation to improve rate capability



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# **KOH Activation**

Mortar X00 wt% KOH with graphite

Heat treatment at 720 °C to activate graphite

Wash in dilute HCL + hot water, filter, and dry



under 5ppm.

Dante Zakhidov<sup>1,2</sup>, R Sugamata<sup>3</sup>, T. Yasue<sup>3</sup>, T. Hayashi<sup>3</sup>, Y. A. Kim<sup>3</sup>, M. Endo<sup>4</sup>



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