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**Regular Arrays of Germanium Nanoparticles Assisted by Thermoset Polymer Composites for High Capacity Lithium Ion Battery** GYUHA JO, Pohang University of Science and Technology (POSTECH), MOON JEONG PARK, POSTECH (Pohang University of Science and Technology) — In recent years Li-batteries have attracted significant interests for a variety of applications such as portable electronics and electric vehicle (EV) batteries due to their high energy densities. Key challenges in advancing the technology lie in specific energy density, the long term cycle properties, and durability at elevated temperature. In present study, we were motivated to prepare high capacity Li-battery by creating regular arrays of germanium nanoparticles (GeNPs, 1600 mAh/g) to replace commercial graphite anode (370 mAh/g). Thermoset polymers were employed to prepare GeNPs/polymer composites with tunable NP loadings and spacings, followed by carbonization process to prepare GeNPs/carbon composite anode material. Due to the large volume change of GeNPs with charge/discharge cycles, the regular arrays of GeNPs are turned out to be a crucial parameter in obtaining enhanced cyclability. The GeNPs/carbon anode materials were cycle tested in a half cell configuration using Lithium foil as a counter electrode and lithium salt doped PS-PEO block copolymers as electrolytes. High capacity and rate capability were achieved, which demonstrate the role of nano-sized and regularly-arrayed anode active materials in obtaining the improved battery performance.

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