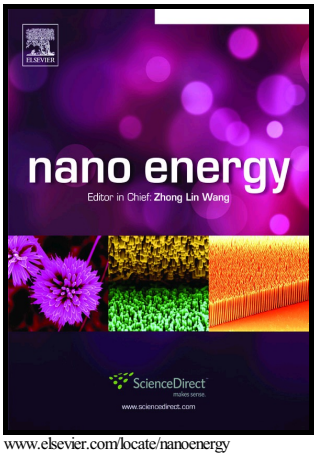


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# High Areal Capacity, Long Cycle Life Li-$O_2$ Cathode Based on Highly Elastic Gel Granules

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**Abstract**

We introduce a "gelating-cutting" strategy to improve specific areal capacity and cycle life for Li-$O_2$ cathode. Conventional Li-$O_2$ cathode with liquid electrolyte is gelated with highly elastic crosslinked polymer and cut into 50~200 μm granules. The gaps between the packed gel granules efficiently induce oxygen to the inner part of the cathode, leading to even $Li_2O_2$ growth in thick cathode. Meanwhile, the elasticity of the polymer chain helps to keep good contact between carbon and $Li_2O_2$ nanoparticles, which facilitates the electron transfer and improves the cyclability. Without any catalyst, the granular gel cathode is able to run 170 cycles at a fixed capacity of 1000 mAh $g_{carbon}^{-1}$, or maintains a specific capacity higher than 10500 mAh $g_{carbon}^{-1}$ (12.6 mAh $cm^{-2}$) during 11 cycles of full discharge-charge. Since good contact is the precondition to any electrochemical reaction, our strategy is a general way to enhance the performance of Li-$O_2$ cathodes.

**Keywords:** Li-$O_2$ battery; areal capacity; elastic polymer; $Li_2O_2$ growth; gel