

# Cathode Reactions In The Rechargeable Aprotic Li-O<sub>2</sub> Battery

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Rechargeable battery technologies such as Li-ion have revolutionised personal electronics over the last 25 years. However, Beyond Li-ion technologies are becoming increasingly important towards meeting society's future energy storage needs. We must explore these alternatives, such as the Li-air (O<sub>2</sub>) battery, which can offer higher practical specific energy densities than Li-ion batteries; however there remain many challenges to be overcome before Li-O<sub>2</sub> batteries are commercialised.<sup>1-5</sup> One spin-off from the recent interest in rechargeable Li-O<sub>2</sub> batteries, based on aprotic electrolytes, is the significant advances made in understanding the fundamental processes occurring on O<sub>2</sub> reduction (discharge) at the cathode.<sup>6-12</sup>

Based on these studies, it is generally accepted that a solution growth mechanism will be required to achieve high rates and capacities. One way to achieve discharge in solution is use of high donor or acceptor number (DN/AN) electrolytes,<sup>13,14</sup> but these are typically less stable towards LiO<sub>2</sub> and Li<sub>2</sub>O<sub>2</sub> than their low DN/AN counterparts.<sup>15</sup> To solve this dilemma, additives, such as redox mediators, have been introduced into low DN/AN electrolytes to encourage the discharge in solution.<sup>13,16-18</sup> Here, we discuss our recent studies into the electrochemistry at the cathode, in the presence of additives.



**Fig.1** Schematic representation of a rechargeable Li-air battery.

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