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Autore	Zhang Huamin
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Sommario/riassunto	This brief reviews the fundamentals, recent developments, challenges and prospects of Li-S and Li-O <sub>2</sub> batteries, including fundamental research and potential applications. It starts with a brief overview encompassing the current state of Li-S and Li-O <sub>2</sub> battery technology. It then provides general information on Li-S and Li-O <sub>2</sub> batteries, including the electrochemical processes and battery components. The following sections focus on the historical and recent development of Li-S and Li-O <sub>2</sub> batteries respectively, offering detailed insights into the key material development, cell assembly, diagnostic test and mechanism of electrolyte decomposition. Lastly, it focuses on the main promising applications of Li-S and Li-O <sub>2</sub> batteries together with their challenges and potential.