A novel $\text{Sm}_{0.5}\text{Sr}_{0.5}\text{Co}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$ /acetylene black composite as bifunctional electrocatalyst for oxygen reduction/evolution reactions

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The development of high efficient perovskite/carbon composite catalysts is an important means to improve the performance of clean energy devices such as metal-air batteries. For this reason, we report a bi-functional $\text{Sm}_{0.5}\text{Sr}_{0.5}\text{Co}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$ /acetylene black composite electrocatalyst, consisting of the $\text{Sm}_{0.5}\text{Sr}_{0.5}\text{Co}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$ (SSCF) nanofibers and acetylene black (AB). Owing to the electronic coupling effect of Fe and Co and the spillover effect of AB on $\text{Sm}_{0.5}\text{Sr}_{0.5}\text{Co}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$, SSCF/AB exhibits outstanding OER and ORR performance. In 0.1M KOH solution, the OER Tafel slope of the SSCF/AB catalyst with the optimal mass ratio is 66.7 mV dec⁻¹, the ORR Tafel slope is 129.6 mV dec⁻¹. And after 1000 CV cycles, the stability performance of the catalyst remains good.

Keywords: OER/ORR; Air electrode; $\text{Sm}_{0.5}\text{Sr}_{0.5}\text{Co}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$; Nanofibers

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