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Synthesis and characterizations of (2×2) tunnels structured manganese dioxide nanorods with a phase for lithium air batteries

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The (2×2) tunnels structured manganese dioxide nanorods **L** with a phase $(\alpha$ -MnO₂) are synthesized via simplistic hydrothermal method at low temperature. The obtained tunnels structured α -MnO₂ nanorods are characterized by, Transmission electron microscopy, Scanning electron microscopy, and X-ray diffraction techniques. The oxygen

reduction reaction (ORR) activity was studied by cyclic voltammetry and rotating ring-disc electrode voltammetry techniques in alkaline media. Moreover; the highly electrocatalytic tunnels structured a-MnO₂ nanorods were then also applied as cathode in rechargeable Li-O₂ cells. The Li-O, cells exhibited initial discharge capacity as high as ~4000 mAh/g with the tunnels structured α -MnO₂ nanorods which was double the original capacity of the cells without any catalyst. Also, we obtained 100% round trip efficiency upon cycling with limited capacity for more than 50 cycles.

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