POROUS POLY(DICYCLOPENTADIENE) BASED CATHODE MATERIALS FOR LITHIUM-OXYGEN BATTERIES

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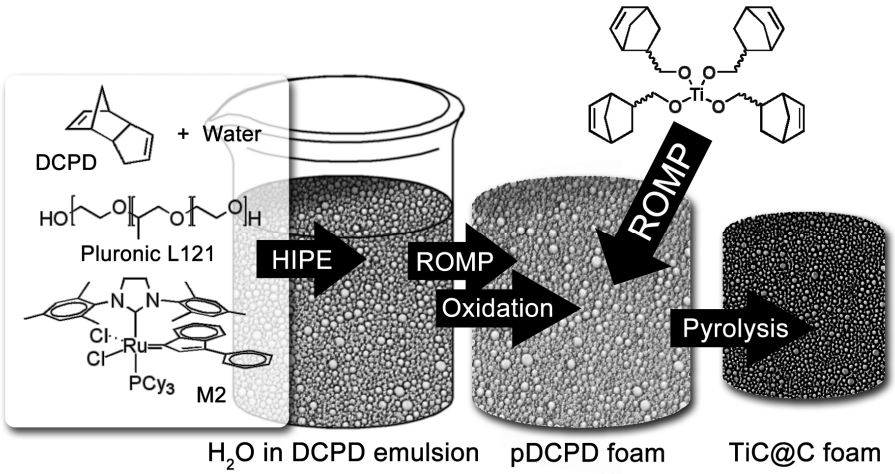
Conventional cathode materials in lithium-oxygen batteries suffer from degradation and therefore diminish the cycling efficiency of these promising future energy storage systems. Amongst fighting such degradation by other means [1], titanium carbide (TiC) based electrode materials were shown to resist the harsh reaction conditions in Li-O_2 cells [2]. However, high capacities can only be obtained when highly porous electrode materials are employed. Herein we demonstrate a Ring-opening Olefin Metathesis Polymerization (ROMP) based way for the preparation of hierarchically porous TiC on carbon with BET-surface areas of approx. 450 m^2/g.



The synthetic route comprised emulsion templating of dicyclopentadiene [3], curing of the emulsion via ROMP, oxidation of the resulting monolith, filling of the pore structures with a Ti-monomer, a second ROMP step, and finally carbonization at 1400°C. The resulting conductive TiC foams were shown to be superior cathode materials in Li-O_2 batteries in comparison to similarly prepared carbon foams and TiC nanoparticles.

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[3] Kovačič, S.; Matsko, N. B.; Jeřabek, K.; Krajnc, P.; Slugovc, C. *J. Mater. Chem. A* **2013**, *1*, 487.