ZnO Contrasted Nano Tomographies of Fuel Cell and Battery Components

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The performance and stability of fuel cells, batteries and other electrochemical systems heavily relies on the nano-morphology of core components, e.g. electrodes or interfaces. To investigate these nano-porous materials or to create models based on the real structure, FIB-SEM tomography is the method of choice. However, as these nano-porous materials comprise carbon, typical infiltration methods fail to give good contrast between carbon and pores.[1] We recently demonstrated the infiltration of a fuel cell electrode with ZnO via atomic layer deposition yielding high contrast. [2] In this work we present the adaption of this technique to further samples: We calculate the nano porosity of the carbon binder domain of a $LiCoO_2$ battery (58%) and use a model to predict the swelling induced volume expansion (114%) of the contained PVDF. [3] The reconstruction of the interface of a fuel cell catalyst layer and microporous layer yields roughnesses of 102 nm and 129 nm respectively and indicates that the interface behaves like a homogeneous transitional region on the investigated scale.

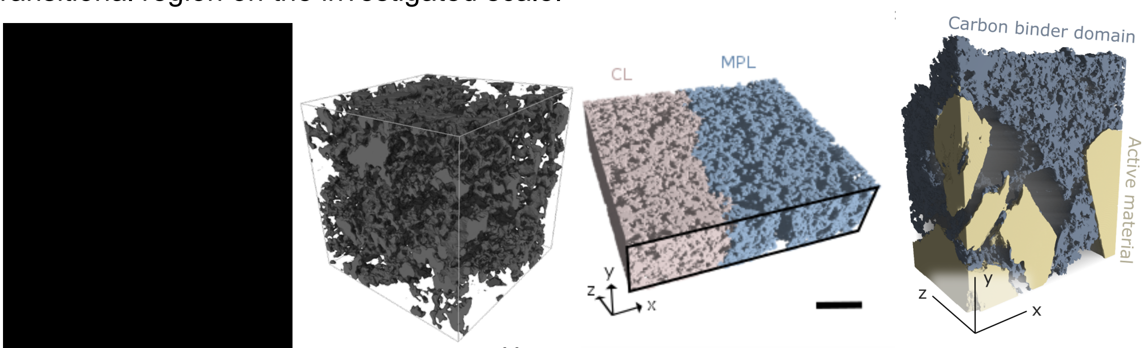

Figure 1 *From left to right: A reconstructed catalyst layer[2] (Gore PRIMEA A510.1), a microporous layer (SGL Sigracet 25BC), the interface of the catalyst layer and the microporous layer of a gas diffusion electrode (Paxitech 0.5 mgPt/cm²) and the carbon binder domain of a $LiCoO_2$ battery[3] (fabricated by Saft America).*

***Keywords**:* FIB-SEM tomography, electrode, conductive additive, PEM fuel cell, Li battery

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