catalysts

MDPI

Supplementary Information

Binder-Free Construction of a Methanol-Tolerant Pt/TiO_2/Carbon Paper Anode by Atomic Layer Deposition

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Figure S1 shows the comparison of the pictures made by the secondary electron (SE) and backscattered electron technique (BSE). The backscattered electrons are high-energy electrons which can be used to show the distribution of different elements in the sample since heavier elements can backscatter more electrons. This means that heavier elements appear brighter in images. In Figure S1a,b it is visible that the carbon paper was covered homogeneously by a heavier element—namely, platinum. We assume that these are the platinum nanoparticles that are also visible on the TEM images. Some of the larger particles are even visible at this magnification. In Figure S1c,d, scanning electron microscope images of the 25c TiO2 + 20c Pt catalyst can be seen. Due to the smaller particle size, smaller quantity of platinum, and the additional titanium dioxide, the high contrast caused by the noble metal is less visible in this case.

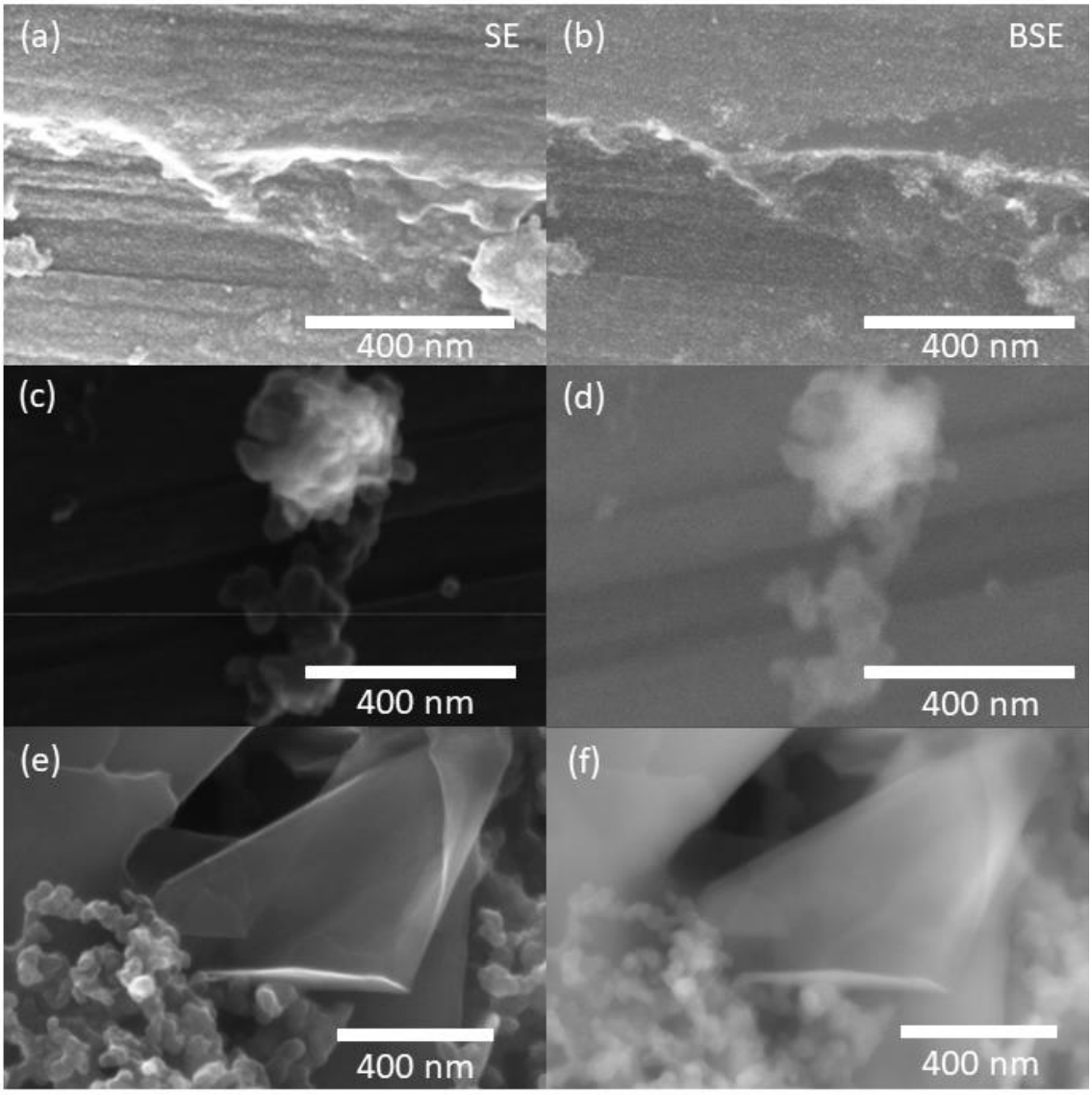

Figure S1. Scanning electron microscopy images of the surfaces of the ALD-prepared electrodes. The images in the left column were generated made by the secondary electron (SE) technique and the images on the right by the backscattered electron (BSE) technique. (**a**,**b**) 20c Pt; (**c**,**d**) 25c TiO2 + 20c Pt; (**e**,**f**) bare carbon paper.

Figure S2 shows the micro-CT pictures of the ALD-prepared electrodes 20c Pt (B) and 25c TiO2 + 20c Pt (C) compared to the bare carbon paper (A). If we use the same setting it can be seen that the contrast improved significantly after the ALD process. This is especially true for the amorphous carbon which covers the carbon fibres and the space between them and which are almost transparent to X-rays. The improved contrast can be attributed to the presence of higher Z elements (Pt and Ti) which have higher absorption. Figure S2D shows the side view of the 20c Pt electrode where it can be seen that the platinum covered the inner pores evenly since no sharp edge is visible where the contrast changes.

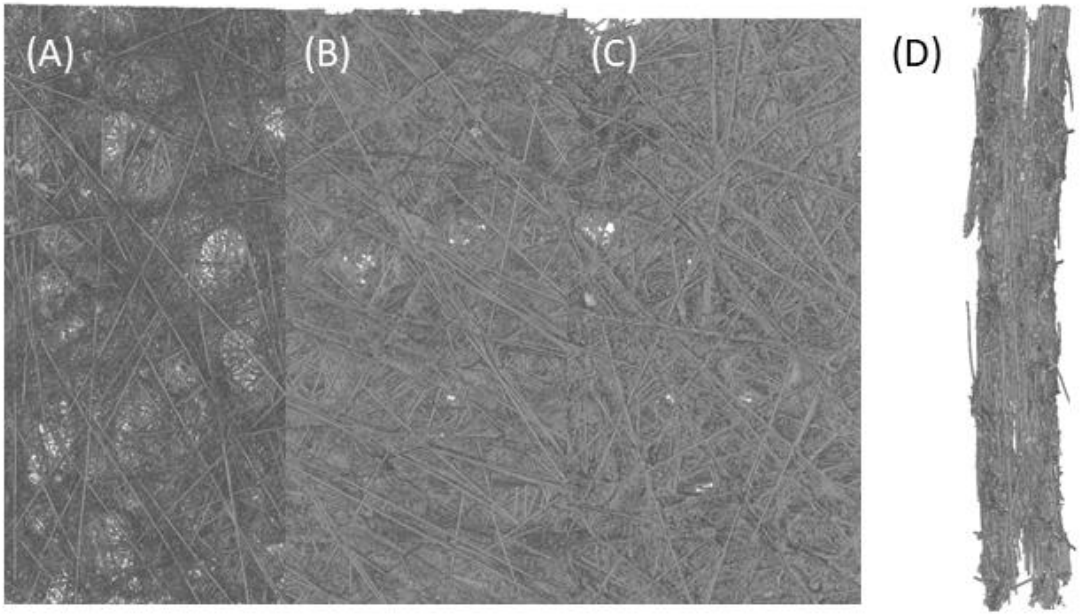

Figure S2. Micro-CT images of the bare AvCarb P75 carbon paper (**A**), the 20c Pt electrode (**B**), the 25c TiO2 + 20c Pt electrode (**C**), and side view of the 20c Pt electrode (**D**).

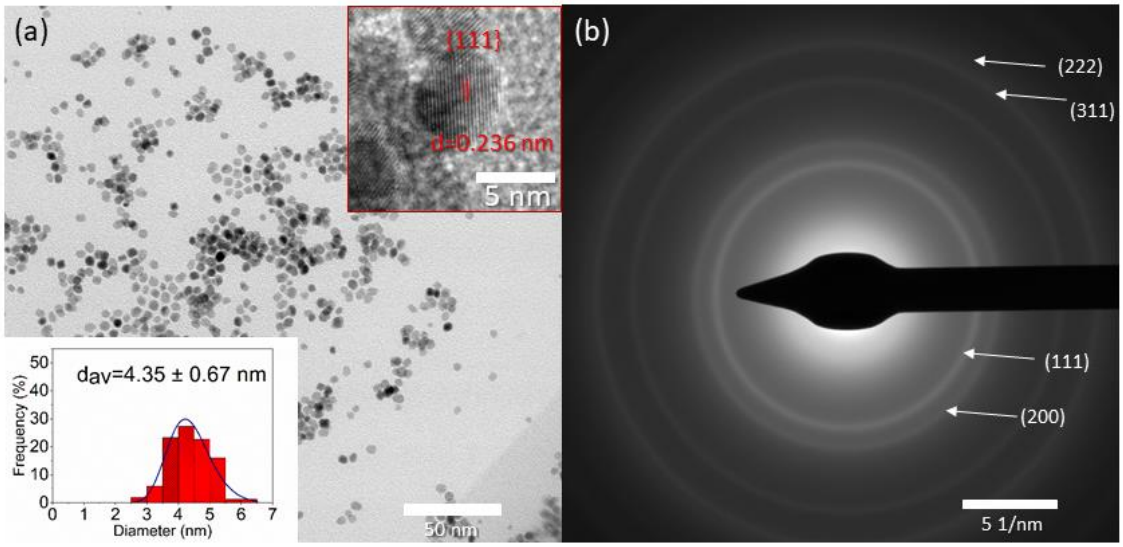

Figure S3. Transmission electron microscopic image (**a**) and electron diffractogram (**b**) of the polyol catalyst.

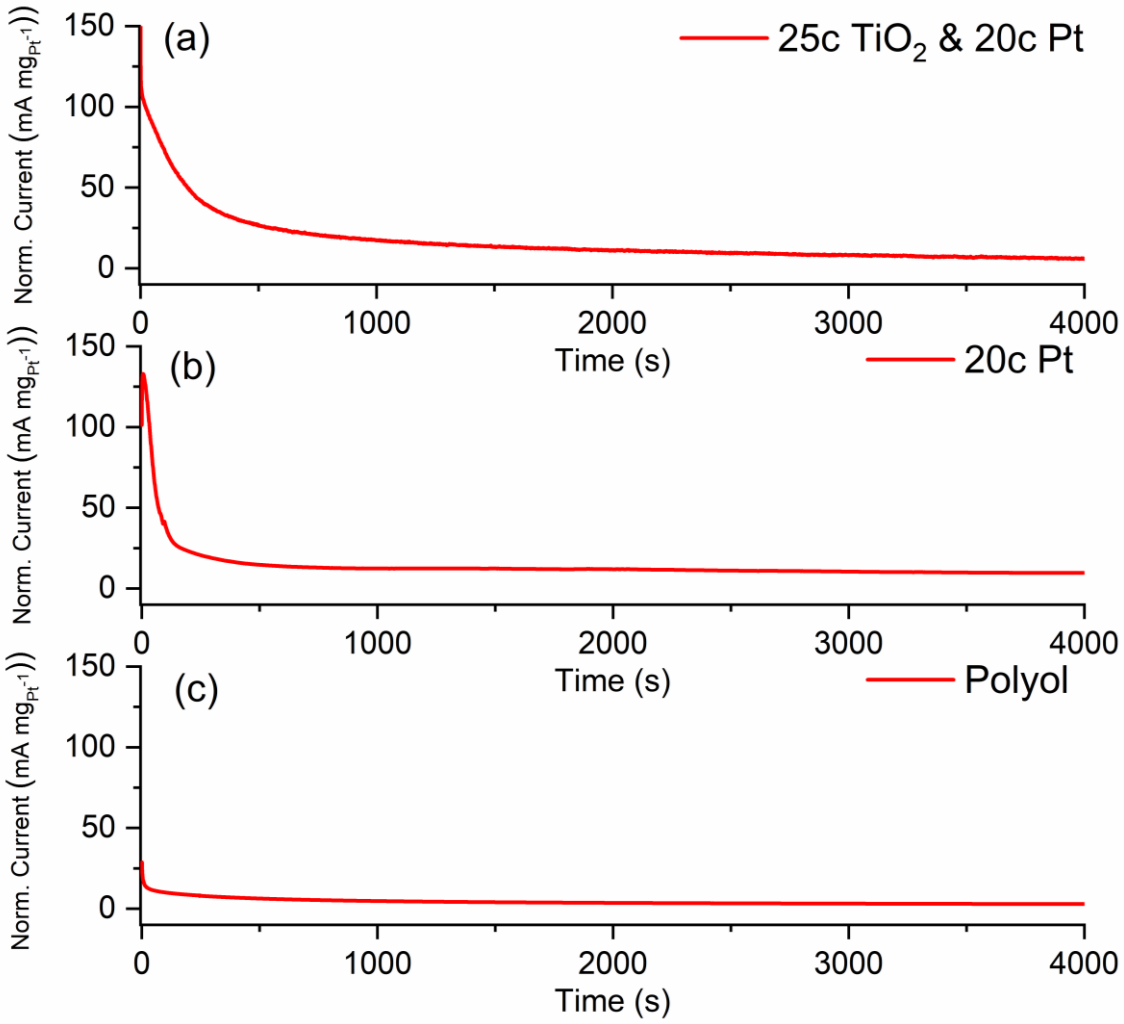

Figure S4. Chronoamperometric measurements of the ALD-prepared catalysts: 25c TiO2 + 20c Pt (**a**); 20c Pt (**b**); Polyol catalyst (**c**).