Multylayers on reinforcement fiber fabrics with ALD

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Carbon fiber fabrics, with a size of 30×8 cm, were coated with combinations of three different Atomic layer deposition layers (ALD). We used inorganic ALD coating (Al_2O_3[1], $Ti_3(PO_4)_4$[2]) as well as an organic-inorganic TiO_2/furfuryl alcohol coating.[3] The coatings were combined in such a way that stacks of inorganic/organic-inorganic/inorganic were produced. The layer thickness and the homogeneity of each layer and the combination of the three layers were investigated with scanning electron microscopy (SEM) and thermogravimetric analysis (TGA). The elemental analysis of the coating in the different layers was investigated with energy-dispersive X-ray spectroscopy (EDXS). So it is possible to distinguish the layers based on the intensity and the appearance of each element at the linescan. Also SEM shows the morphology of the layers. The coated fabrics will be embedded in a ceramic matrix to give a fiber reinforced ceramic, in which the coating should provide oxidation protection for carbon fibers and also the coating may be helpful for crack deflection in the composite

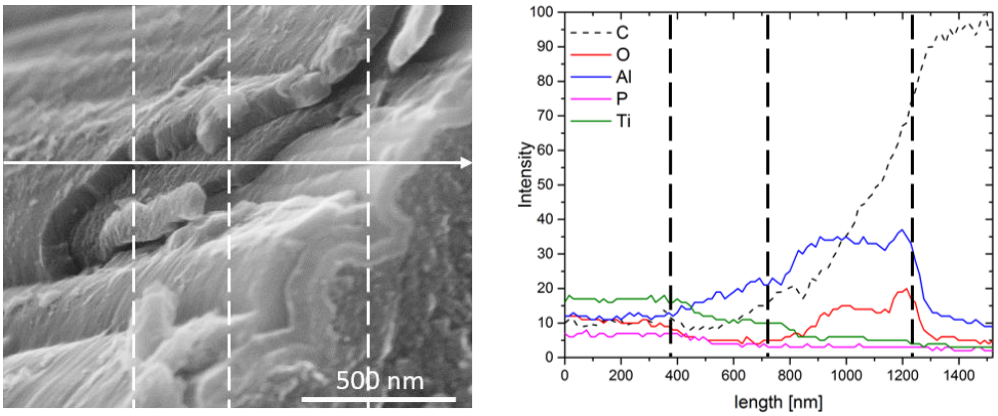

Figure 1. SEM Image of the three layer on the carbon fiber and the EDX linescan of that sample.

[1] A. K. Roy, W. Baumann, S. Schulze, M. Hietschold, T. Mäder, D. J. Nestler, B. Wielage, W. A. Goedel, *J. Am. Ceram. Soc.* **2011**, *94*, 2014, DOI: 10.1111/j.1551-2916.2010.04340.x.
[2] C. Militzer, J. Buchsbaum, V. Dzhagan, D. R. T. Zahn, H. Wulff, C. A. Helm, W. A. Goedel, *Adv. Mater. Interfaces* **2018**, *5*, 1800423, DOI: 10.1002/admi.201800423.
[3] C. Militzer, S. Knohl, V. Dzhagan, D. R. T. Zahn, W. A. Goedel, *J. Vac. Sci. Technol. Vac. Surf. Films* **2017**, *35*, 01B107, DOI: 10.1116/1.4965699.