

Workshop »Coatings for Energy Technologies«

Transformation from combustion engine to electrochemical energy converters – technological challenges for coating suppliers in automotive industry

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For many years wear resistant thin films and the related coating technology were major business fields of job coaters and coating machine manufacturers in automotive industry. The transformation from combustion engines to green technologies results in severe changes for many players in the branch. One example is the shrinking demand for wear resistant coatings on components of the power train of combustion vehicles. Recent R&D efforts are focused e.g. on element barriers and electrical contact coatings to be deposited onto flat components of electrochemical energy converters.

Those energy converters are key components for a broad establishment of green hydrogen economy. The relevant technologies have been applied for decades in several niche applications. Recently many countries and companies pursue the mass production of fuel cells and electrolyzers. Hence, great efforts are made towards cost efficient systems, components and fabrication methods.

In practice single fuel cells and electrolyzer cells are stacked to a powerful system consisting of up to several hundred cells. The single cells are separated and electrically connected via bipolar plates. Those plates must withstand different electrochemical and temperature conditions without significant deterioration of their performance. Widely applied performance indicators are interfacial contact resistance and corrosion current. Those properties can be perfectly controlled by means of noble metal coatings applied onto steel or other bipolar plate materials. In order to replace this expensive solution, many coating systems and a wide variety of coating techniques have been suggested so far.

The presentation reports on the optimization of both, bipolar plate properties as well as production efficiency based on PVD coating technology. The coating process has been transferred from batch to inline systems with a cycle time of a few seconds. This results in a competitive solution for the mass production of cost-efficient bipolar plate coatings.