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**Plasma nitriding by strip hollow cathode method (SHC-PTT) of austenitic stainless steels for bipolar plates**Krasimir Nikolov<sup>1</sup>, Katharina Köster<sup>1</sup>, Peter Kaestner<sup>1</sup>, Günter Bräuer<sup>1</sup>,  
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The novel strip hollow cathode process for plasma thermochemical treatment (SHC-PTT) is designed for a surface modifying of grounded thin metal strips in continuous technological process. Unlike the conventional application of plasma nitriding, in particular for improving wear resistance of parts and tools defined surface modification frequently requires only relatively thin nitriding layers. For producing such thin diffusion layers SHC-PTT - as compared to conventional plasma nitriding - is very promising to realize a cost effective continuous process due to the significantly reduced processing time in stationary treatment mode.

The present work shows the results from nitriding in pulsed dc glow discharge of EN 1.4301 (AISI 304) austenitic stainless steel sheets by means of SHC-PTT. The objective was to improve the surface electrical properties of the sheets aiming at their use for bipolar plates of proton exchange membrane fuel cell (PEMFC). Sheet samples with a thickness of 0.1 mm were nitrided in a N<sub>2</sub>/H<sub>2</sub> gas mixture at different substrate temperature and glow discharge parameters. Characterization of the nitriding layers was carried out by glow discharge optical emission spectroscopy (GDOES) and X-ray diffraction (XRD). Further the interface contact resistance has been measured and the corrosion behaviour has been determined by means of electrochemical methods. The results demonstrate the potential of the SHC-PTT method for surface modification of austenitic stainless steel sheets within a processing time in the order of a few minutes. Thus for such applications even the potential of a mass production process, e.g. by means of continuous processing of metal strips should be taken into consideration.

**Keywords**

Strip hollow cathode for plasma thermochemical treatment

Austenitic stainless steel sheet

Plasma nitriding

Interfacial contact resistance

Corrosion resistance