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# Strip hollow-cathode – a flexible tool for surface functionalisation of steel strip in continuous mode

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The strip hollow-cathode (SHC) has been developed as a cost-effective method for surface modification of thin metal strips in continuous operation. Plasma pretreatment, plasma-enhanced chemical vapour deposition (PECVD) and plasma thermochemical treatment (PTT) have been studied on a laboratory scale. PECVD of amorphous hydrogenated carbon (a-C:H), amorphous hydrogenated silicon-containing carbon coatings (a-C:H:Si), as well as PTT employing short-time plasma nitriding have been conducted using a laboratory-scale SHC module in a stationary treatment mode.
In this paper, different applications, mainly dedicated to the automotive industry, will be presented. Thin coating systems based on zinc-alloy-coatings in combination with a-C:H:Si coating lead to considerable improvement of the corrosion resistance of autobody steel sheets. Through the opportunity of reducing the coating thickness the processing properties such as laser or resistance spot weldability may be enhanced as compared to conventional coated steel sheets. Short-time plasma nitriding or nitrocarburising has been applied as a surface modification of austenitic stainless steel sheets. Hence, acceptable interfacial contact resistance with regard to their use for bipolar plates of proton exchange membrane fuel cells for alternative automotive driving systems has been achieved.
Further, novel hybrid processes are presented, and the chances and challenges of the SHC for continuous operation of surface modification of steel strips on an industrial scale are considered.

**Keywords**
Strip hollow-cathode
amorphous hydrogenated silicon-containing carbon coating
plasma nitriding
corrosion resistance