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## Use of electrochemical techniques to determine the microporosity of structured PVD coatings

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This work presents a new approach to investigate the microporosity of Physical Vapour Deposition (PVD) coating systems. Therefore different Chromiumnitride (CrN) coatings were deposited on X153CrMoV12 steel using a combined technique with Direct Current Magnetron Sputter (DCMS) and High Power Impulse Magnetron Sputtering (HiPIMS). In order to prepare contrary cases in terms of porosity different coatings were prepared. One system type had a dense micro structure, another a more columnar crystal growth and therefore a higher porosity in this system was expected. The different microstructure was obtained by a modification of the BIAS-Voltage. The porosity of the coatings was investigated using the Scanning Electrochemical Microscopy (SECM) method, polarization curves and optical inspection. Because of the spatial resolution of the SECM the determination of the specific positions where the ions of the iron substrate were able to penetrate the coating reaching the surface was possible. The current changes due to the presence of iron ions were detected at the tip of a polarized platinum microelectrode. The described process is capable of correlating the porosity and the different coating structures in a quantitative and qualitative way. The results show a good agreement between SECM, polarization curves and optical inspection.

### REFERENCES:

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### Keywords

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PVD

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