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# PECVD Ceramic Hard Coatings of Various Materials and Different Testing Methods

Paul Reichle[1], Georg Umlauf[1], Jan Hinnerk Henze[1], Günter E. M. Tovar[2], Christian Oehr[1], Jakob Barz[1]

[1]Fraunhofer IGB, Stuttgart, Germany [2]IGVP Universität Stuttgart, Stuttgart, Germany

paul.reichle@igb.fraunhofer.de

In almost all industrial sectors, the request for specifically adjustable surface characteristics is being voiced. However, often the desired characteristics cannot be reached by the basic material. For example, the solid body is made out of economical plastic material, but the final product is supposed to be resistant to scratches and chemicals. Besides the financial perspective, environmentally-friendly aspects are becoming more and more prominent. Therefore, the surface coating by means of plasma technologies plays an increasingly important role. Multitudes of the deployed basic materials are sensitive to temperature damage and therefore cannot be treated with the common coating methods. A possible solution to this is provided by plasma-enhanced chemical vapour deposition (PECVD) technology. General operating temperatures of distinctly below 200 °C make treatments of almost all common basic materials possible. The focus of this research are different silicon based hard coatings like Silicon nitride ($Si_3N_4$) and Silicon carbide (SiC) as well as oxide ceramic coatings like Aluminum oxide ($Al_2O_3$) and Zirconium dioxide ($ZrO_2$). In the context of testing methods, the coatings are mainly tested on mechanical stability. They are fundamentally tested on coating adhesion as well as wear resistance in dependence on the basic material and its pretreatment. Since there are many applications of the named coatings, additional testing methods have to be employed. Furthermore, scratch resistance and stability to temperature fluctuations are tested. Besides the contact with other solid counter bodies, often the contact with liquids occurs. On this account, more characteristics like wetting properties towards different substances and media resistance is tested. This research points out fundamental possibilities and applications of different coatings. It is carried out in close cooperation between the Fraunhofer IGB and the IGVP of the University of Stuttgart.

**Keywords**
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hard coating
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scratch resistance