

PVD COATING RESEARCH AND JOB COATING SERVICE: BENEFITS AND ISSUES OF DOING BOTH

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In most cases, basic research on PVD coatings is done at the academia, while daily business of job coating at individual industrial sites. There is of course a gradual transition, where an application-oriented department does some servicing of industrial partners, possibly niche applications. On the other hand a job coating company typically performs a development of its own, mainly limited by the applied research for its own needs. While PVD research is global, job coating service has retained its regional character, primarily due to logistical reasons. In a geographic area of medium industrial output, there are only a few smaller job coating centers needed, and same applies to the relevant groups in the academia. Therefore there is an incentive to pursue both activities in one place.

The presentation will be oriented in the experience of 30-year history of doing simultaneously PVD research and job coating at the Jožef Stefan Institute. Nevertheless, the cases reported are applicable elsewhere. Foremost the research topics are broadly dictated by the needs of the local industrial partners: coating design, coating characterization, industrial trials and finally the financial support. Second, doing research in an industrial deposition chamber makes the applicability of these results far more relevant than the ones conducted in a lab (e.g. UHV) environment. Two cases will stress the industrial "origin" of the research, though not directly related to a particular partner's needs: (i) a warranty claim of poor coating quality initiated a successful research of growth defects, (ii) a similar complain of multilayer coating reproducibility was followed by an extensive work on modeling of thin film growth in a multi-rotation system.

Following the trend in publications (both academic and more applied ones) there should be a steady expansion of novel coatings, such as nanocomposites, Hipims, etc, with constantly improving properties, all dedicated to more and more specific needs. However, the industry is often reluctant to change reliable technologies, such as standard TiAlN, or even the old TiN. An all-purpose coating is often more welcome than a series of specific coating types. There is little room for improvement in such environments. In addition, if the chamber should be ready for the next industrial batch tomorrow, the opportunities for long or risky experiments are limited.

SHORT BIO



Asst. Prof. Miha Čekada graduated in physics at the University of Ljubljana, Slovenia, and acquired his PhD in material sciences. His main research topic are the PVD hard protective coatings, but he was also active in some other fields of physics and chemistry of thin films (diffusion phenomena, quasicrystals, diamond-like carbon, tribology). In addition to publications on his own research, he has also been active in editorial (guest editor *Vacuum* and in *Surface & Coatings Technology*), and by organizing symposia/conferences (e.g. EMRS spring meeting: Protective coatings and thin films). Since 2013 he has been the head of the Department of Thin Films and Surfaces at the Jožef Stefan Institute (Ljubljana, Slovenia), which also includes the Hard Coating Center. The latter requires a strong emphasis on industrial application, such as implementation of PVD coatings in production, development/modification of coatings, failure analysis, etc.