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The impact of different plasma technologies on the coating properties

Developing new coatings and bringing them out of the R&D phase into actual applications is not an easy task. The presentation illustrates how we have developed new coatings based on reactive sputtering processes utilizing different plasma techniques, HiPIMS, pulsed DC and DC magnetron sputtering. The HiPIMS platform was used to develop a very hard TiB₂ coating characterized by a low residual stress level. Pulsed DC magnetron sputtering was used to deposit a stable 50 µm thick amorphous Al₂O₃ coating for CERN's next generation superconducting magnets. Finally, DC magnetron sputtering was used to deposit different types of low friction carbon-based coatings tailored for different applications, such as a low-friction coating for dental application and a Si-containing a-C:H:Si coating with increased hardness and improved temperature stability as compared to a-C:H.

The developed coatings were characterized by SEM, nanoindentation, RBS, XPS, EDS, GDOES, XRD, etc. The presentation will provide examples of model tests including different types of wear tests as e.g. pin-on-disk, reciprocal sliding tests, scratch testing as well as more application-oriented tests that might be more useful when bringing new coatings into industrial applications.

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