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Chromium and Chromium nitride thin films deposited by HiPIMS using short pulses

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CrN is an excellent wear and corrosion resistant material. There is much interest in the research community to develop CrN thin films for coating tools for metal and wood machining operations. Chromium nitride was widely studied and developed by classical magnetron sputtering and more recently for further improvements by HiPIMS.
In this work, we varied different process parameters but we choose to focus on the short durations, typically between 10 and 50µs. We have studied the influence of peak current on the crystallinity and the morphology of coatings. Deposited films were characterized by classical techniques such as: XRD, AFM, SEM and XPS. Nanoindentation and oxidation tests were also performed. Concerning hardness measurements, the Jönsson and Hogmark model was applied to separate the contributions of the substrate and the film. Annealing tests were carried out up to 1000K in order to study the thermal stability of Cr and CrN films under different atmospheres.

Keywords
HiPIMS
DC sputtering
Cr-CrN thin films