

Self-Reporting Ceramic Coatings: Proof of concept for tracking phase transitions, decomposition and oxidation behavior

J. Schneider.

Materials Chemistry - RWTH Aachen - Aachen (Allemagne)

Monitoring structural health and integrity of coated components is of vital importance for increasing their lifetime and the overall sustainability of the targeted applications. Here, it is demonstrated that in addition to phase transitions in Cr₂AlC [1] also their decomposition reactions as well as the temporal oxidation behavior of TiN thin films [2] can be tracked by in situ sheet resistance measurements. Based on correlative film morphology, structure and local composition data it is evident that observed resistance changes are caused either phase transition, decomposition or oxidation. Hence, the in situ measured sheet resistance is an autonomous self-reporting property useful for tracking the temporal oxidation behavior of TiN coatings [2] as well as phase transitions [1] and decomposition in Cr₂AlC coatings.

References

[1] B. Stelzer, X. Chen, P. Bliem, M. Hans, B. Völker, R. Sahu, C. Scheu, D. Primetzhofer, J. M. Schneider, Remote tracking of phase changes in Cr₂AlC thin films by in-situ resistivity measurements, *Scientific Reports* 9, 8266 (2019) [2] B. Stelzer, M. Momma, J. M. Schneider, Autonomously Self-Reporting Hard Coatings: Tracking the Temporal Oxidation Behavior of TiN by In Situ Sheet Resistance Measurements, *Advanced Functional Materials*, 2000146, (2020)