

# Investigation of the growth of W-Cr Janus-like thin film nanocolumns

## B. Nano-engineered coatings and thin films: from design to applications

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### Abstract

Metal oxide semiconductor (MOS) gas sensors have attracted considerable attention in recent decades due to their crucial role in environmental monitoring, industrial safety, and medical diagnostics. However, developing sensitive and stable sensing materials remains a significant challenge. One effective strategy to enhance sensing performance is the creation of heterojunctions. The combination of two or more MOS materials often results in improved sensing properties compared to single-component systems, as the interface between the materials can induce pronounced resistance modulation effects, thereby influencing the overall sensor response.

In this work, we report the fabrication of W-Cr Janus-like nanocolumnar thin films using the Oblique Angle Deposition (OAD) co-sputtering technique, aimed at forming P-N heterojunctions. The sensor is located between two opposite 2'' targets, inclined at 80° and with a target-to-substrate distance of 95 and 65 mm for chromium and tungsten, respectively. Due to this configuration, the films are composed of vertically aligned bicomponent columns, each of them having chromium on one face and tungsten on the other face. The growth of this very specific two-faces columnar microstructure is investigated via simulation and compared to comprehensive