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Correlation between deposition parameters of periodic titanium metal/oxide nanometric multilayers and their chemical and structural properties investigated by STEM-EELS

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Highlights

Titanium-based metal/oxide periodic multilayers were sputter-deposited by gas pulsing.

α -TiO₂+rutile/fcc-TiO/ α -Ti alternations were evidenced by HRTEM.

STEM-EELS analyses supported the occurrence of fcc-TiO phase at TiO₂/Ti interfaces.

Structural and chemical characteristics were correlated with sputtering conditions.

Abstract

We analyze structure and composition of titanium-based metal/oxide periodic multilayers prepared by reactive sputtering. The reactive gas pulsing process is involved to periodically inject the oxygen gas during the multilayers deposition. This approach allows the growth of regular and tunable nanometric TiO₂/Ti periods with thicknesses ranging from 14 to 50 nm. The interfacial layer between oxide and metallic layers is mainly the fcc-TiO phase as clearly pointed out by transmission electron microscopy and associated electron spectroscopies. In

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