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Qualitative interpretation of the valence Auger spectra at metals/ceramics interfaces

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The atomic interaction (chemical bonding) across the interface between deposited metal(M) films and ceramic substrates is discussed using Auger electron spectroscopy. The sapphire and the silica are chosen as the oxide and the AlN and the Si₃N₄ are used as the nitride.

The titanium (Ti), the chromium (Cr) and the silver (Ag) are used as the metal. The annealed interfaces are compared with the as-deposited interfaces.

A simple one electron and two cores model under the the linear combination of atomic orbital (LCAO) approximation is useful for the qualitative interpretation of the Auger line shape. It is required for the interpretation that the electronic dose and the sputtering damage are kept constant across the interface.

The interfaces were classified into two types. One is the interface where the ceramics substrate is reduced and the other is the interface where it is not reduced. Our results are in good agreement with thermochemical data. It is suggested that our valence Auger analysis is applicable to the metal/ceramic systems as one of the evaluation method.