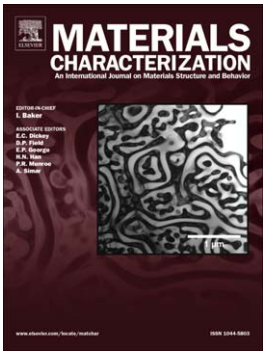

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Investigation of Pb/Ru(0001) by means of AES and LEED

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Abstract

Auger electron spectroscopy (AES) and low energy electron diffraction (LEED) were used to study the growth mechanism, thermal stability and long range order of Pb on the Ru(0001) surface. The adsorption at 330K leads to the formation of the wetting layer. The character of the Auger signal decay during the continuous Pb adsorption after the wetting layer formation suggests the growth of Pb islands and/or a significant decrease of the sticking coefficient. The Auger signal recorded during the heating of the adsorbed Pb layer reveals a sudden agglomeration of 3D islands on the first wetting layer at about 600K. Then the desorption of the adsorbate at elevated temperatures first from the 3D islands and then from the wetting layer is observed. A detailed analysis of LEED patterns recorded during the continuous Pb adsorption indicates the presence of the $c(4\times 2)$ structure at low coverages, the splitting and disappearance of some reflexes, and then the sequential formation of the $\begin{pmatrix} 2 & 1 \\ -0.25 & 1.5 \end{pmatrix}$, $(\sqrt{7}\times\sqrt{7})\mathrm{R}19.1°$ and $\begin{pmatrix} 2.4 & 0.7 \\ -1 & 2.45 \end{pmatrix}$ structures. The mutually rotated adsorbate domains were identifed within each structure. The registered LEED patterns show the continuous transformations $c(4\times 2)\rightarrow\begin{pmatrix} 2 & 1 \\ -0.25 & 1.5 \end{pmatrix}$ and $(\sqrt{7}\times\sqrt{7})\mathrm{R}19.1°\rightarrow\begin{pmatrix} 2.4 & 0.7 \\ -1 & 2.45 \end{pmatrix}$ at increased Pb coverages. The discontinuous transformation was found for the $\begin{pmatrix} 2 & 1 \\ -0.25 & 1.5 \end{pmatrix}\rightarrow(\sqrt{7}\times\sqrt{7})R19.1°$ structural change.