

electron microscope (TEM) by the capability to detect light elements, like B, C, N and O. For very thin samples the calculation of elemental concentrations due to Egerton (1978) leads to useful results. Solid state investigations at the TEM often employ sample foils thicker than 100 nm. There the mentioned quantification is in error because of the plural inelastic scattering, altering the intensity distribution of the characteristic edges. Usually, at first, the background has to be removed and then a deconvolution has to be accomplished. However, the background stripping is critical especially at the destroyed edges of thicker foils, leading to a dramatic uncertainty of quantification. We have developed a new technique, removing the background after the deconvolution. We use the hydrogenic approximation for the single loss profile as a statement, convolute this profile with the low loss region and compare the result with the measured edge region of the spectrum by a least-squares fit. The method is accomplished by the PDP-11/02 computer at our JEM-200 CX microscope. Even for strongly smeared spectra we obtain poor single loss edges well suitable for quantification. The basic principle of our technique is explained and data illustrating the results are presented.

Reflection electron energy loss spectroscopy (REELS) of some oxide films on substrates

G Gergely and A Sulyok, *Research Institute for Technical Physics of the Hungarian Academy of Sciences, H-1325 Budapest, PO Box 76, Hungary*

REELS of thin oxide films on aluminium and silicon substrates has been done making use of elastic peak electron spectroscopy. In recent work, experimental evidence proved the dominant role of the two process model in REELS. The core level loss peak consists of inelastic scattering (IS) and elastic reflection (ER) processes: IS + ER or ER + IS within the thin film, IS in the film and ER in the substrate, before or after the loss event. The analysis is given of these processes, deducing formulas for evaluating REELS experimental results. The elastic peak consists of ER within the film and the substrate. Experiments have been carried out with a Ribier OPC 103 CMA—lock in—on line computer system. Theoretical and experimental results vs the E primary electron energy are presented.

Adsorption and decomposition of NO on potassium promoted Rh(111)

L Bugyi and F Solymosi, *Institute of Solid State and Radiochemistry, University of Szeged; and Reaction Kinetics Research Group of the Hungarian Academy of Sciences, PO Box 105, H-6701 Szeged, Hungary*

The interaction of NO with clean and potassium covered Rh(111) surfaces has been investigated by LEED, Auger electron, electron energy loss (in the electronic range) and thermal desorption spectroscopy in the temperature range between 100 and 1200 K.

After saturation of the clean surface with NO at 300 K two NO desorption peaks were observed, at $T_p = 397$ and 447 K. At the same time, N_2 also desorbed, at $T_p = 460$ and 773 K indicating that NO dissociates on Rh(111) surface at higher temperatures.

Pre-adsorbed potassium changed only slightly the rate and extent of NO uptake on Rh(111) at 300 K up to $\theta_K \approx 0.3$ coverage, but it promoted the dissociation of adsorbed NO. At higher potassium coverage the dissociation was almost complete.

Adsorption of NO on Rh(111) at 100 K produced three losses at 6.4, 12 and 15 eV in EEL spectrum. The same losses were found on potassium covered surfaces.

From the temperature dependence of these losses and from TD spectra it appeared that the effect of potassium is a twofold one: it slightly increases the temperature of the existence of NO on the Rh and it promotes the dissociation at higher temperatures.

Adsorption of H₂O and O₂ on Rh surfaces studied by AES, ELS and TDS

J Kiss and F Solymosi, *Institute of Solid State and Radiochemistry, University of Szeged; and Reaction Kinetics Research Group of the Hungarian Academy of Sciences, PO Box 105, H-6701 Szeged, Hungary*

Water adsorption on metal surfaces is of fundamental interest in catalysis and electrochemistry. The interaction of water with clean, boron and oxygen pre-covered Rh surfaces was studied by AES, ELS (in electronic range) and TDS. Water vapour undergoes reversible molecular adsorption and desorption on clean Rh(111) and Rh foil. The weakly chemisorbed layer desorbed with a peak temperature of 182–200 K. Above 0.5 L exposure a second peak was developed at a peak maximum of 158 K, which corresponds to the formation of a multilayer of ice. The adsorbed water produced three losses at 14, 10.4 and 8.7 eV.

The presence of surface boron caused the dissociation of adsorbed water which was indicated by evolution of H₂ and appearance of 9.4 eV loss above 200 K due to the formation of B–O bonds. The adsorption of oxygen on boron-contaminated Rh foil also produced this loss. Adsorption of H₂O in the presence of the electronegative oxygen additive on the Rh sample leads to formation of OH radicals. Upon heating, the dissociation process is followed by a disproportionation reaction, which results in a shift of the H₂O desorption peak towards higher temperatures: $T_p \approx 220$ K.

The nature of the adsorption states of hydrogen on surfaces of thin transition metal films

R Duś, *Institute of Physical Chemistry Polish Academy of Sciences ul Kasprzaka 44, 01-224 Warszawa, Poland* and

E Nowicka, *Space Research Centre, Polish Academy of Sciences, ul Orłowa 21, 01-237 Warszawa, Poland*

One can expect that essentially three kinds of the adsorption states of different physical character, e.g. binding energy, electrical properties, etc. and probably different chemical reactivity, can be formed on transition metal surfaces due to: (i) adsorption on surface sites of different bonding potential; (ii) mutual interaction within the adsorbate; (iii) adsorbate–adsorbent chemical reaction leading to new compound formation on the surface.

The aim of this work was to find what adsorption states are