

AUGER AND ESCA APPLICATIONS IN METALLURGY

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S U M M A R Y :

Auger- and Photoelectronspectroscopy (ESCA) are the most efficient methods to solve surface-related problems in material science. They provide chemical information (elemental composition and oxidation-states) of the upmost atomlayers of solid materials. The strength of these methods is the high surface sensitivity with a depth resolution of 5 - 20 Å.

In the field of metallurgy Auger and- Photoelectronspectroscopy have been successfully applied in failure analysis, alloy- and process development. In many cases specifically the combination of Auger and ESCA measurements is of importance.

Examples of alloy oxidation and corrosion will be discussed in connection with depth profile analysis and ESCA.

The alloy embrittlement introduced by grain boundary segregation is gaining more attention since high vacuum fractured samples have been analyzed by Scanning Auger. Very small amounts of impurities are showing sometimes detrimental results and recude the tensile- and impact strength significantly.

In addition welding and brasing failures will be discussed.

The importance of surface segregation as a tool to improve the friction properties of alloys will be shown in few examples.

Vacuum annealing of transition metal alloys introduce sometimes brittle surface layers if small amounts of reactive residual gases are present. These reactions can be precisely controlled by Auger analysis.