COOPERATION OF JEM-200A ELECTRON MICROSCOPE WITH ENERGY DISPERSIVE X-RAY SPECTROMETER IN THE INVESTIGATION OF REAL CRYSTAL STRUCTURE

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For the first time the possibility has been utilized of a detailed analysis of micro-regions of specimens observed with the aid of the JEM-200A electron microscope at 200kV accelerating voltage by inserting into the microscope column the energy dispersive X-ray spectrometer. Experiments were carried out on slabs of ZnTe monocrystals. By utilizing this method it was found that in those regions of the crystal where big clusters are observed of precipitates, situated on dislocations or on stacking faults **(Fig. 1)**, there occurs a rise of TeKα and TeLα line intensity in comparison to regions, where such precipitates are not observed **(Fig. 2)**. This leads to the conclusion that the precipitates are those of Te. **Fig. 3** shows the spectrum obtained from the region shown in Fig. 1 (line 27, 377 keV is identified as TeKα, 31,097 keV TeKβ, 3,769 keV TeLα, 4,029 keV TeLβ, 8,630 keV ZnKα, 9,570 keV ZnKβ). In that figure a big background is observed, due to Bremsstrahlung, but by the application of the Nova 1210 computer with a programme allowing for stripping, only a discrete spectrum is obtained, which is composed of X-ray lines of elements constituting the tested material. **Fig. 4** shows the TeKα line after stripping. The analysing time was 100 s, while the observed intensity of the TeKα line was 3679 counts. In regions free of the abovementioned precipitates the TeKα line intensity amounted to only 1987 counts during the same analysing time. The cooperation of the electron microscope with the energy dispersive X-ray spectrometer makes possible not only the ivestigation of material microstructure on the basis of its diffraction contrast, but also an immediate qualitative analysis of the specimen.

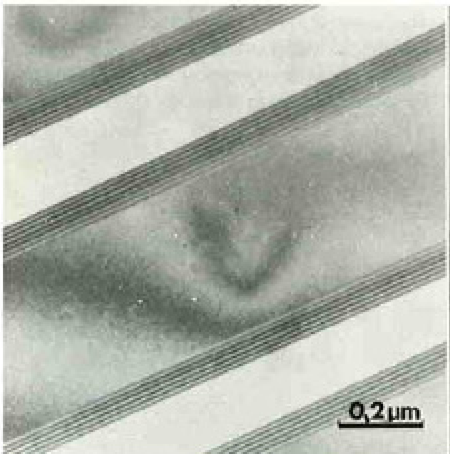

Fig. 1 X30,000

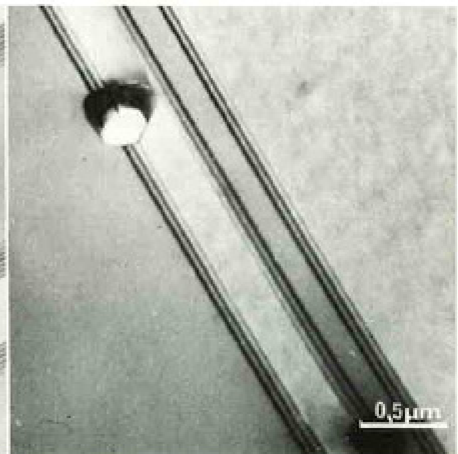

Fig. 2 X23,000

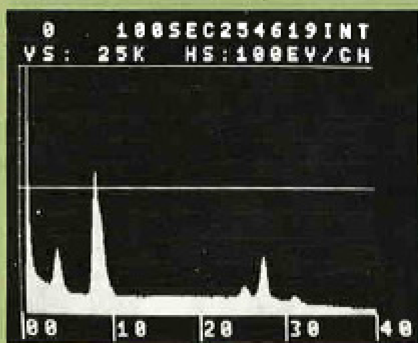

Fig. 3

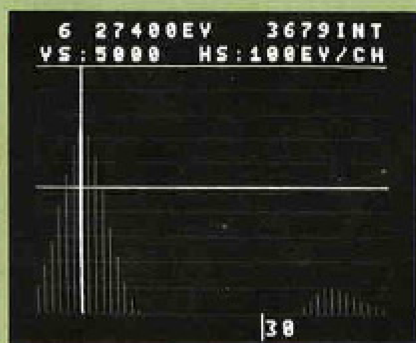

Fig. 4

Fig. 1 Stacking faults in ZnTe monocrystals.

Fig. 2 Precipitates on the stacking faults in ZnTe monocrystals.

Fig. 3 X-ray spectrum from microareas in ZnTe monocrystals

Fig. 4 Kα and Kβ lines of Te after background substractions