

Capabilities of Probe Emission Mössbauer Spectroscopy for Studies on Post-effects of Critical Radiation Exposure in Tantalum

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By the use of ^{57}Co impurity atoms as structure-sensitive physico-chemical probes and X-ray Diffraction method, post-effects of critical radiation-induced effects have been studied that resulted from irradiation of metal tantalum with charged particles.

The small (less than $0.2\ \mu\text{m}$) thickness of surface layers of samples doped with ^{57}Co atoms enabled the direct radiation damage of Ta crystal lattice by proton beams to be excluded (the number of displaced atoms being negligibly low, of less than 0.1 vacancies/ion), as well as the consequences of irradiation of the metal by their "own" Ta atoms to be studied (the number of the displaced atoms being 3900 vacancies/ion), these atoms having been knocked out of the crystal lattice during target bombardments.

The experimental data obtained by both Emission Mössbauer Spectroscopy and X-ray Diffraction methods have shown that irradiation of metal with heavy ions (atoms of Ta) is accompanied by disordering of the metal surface layers: by the formation of thermal- and displacement spikes in metal Ta.

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