

VACANCY TRANSFORMATIONS IN ALUMINIUM

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Evidence is presented supporting the assumption (2), (3) that monovacancies cluster in pure splat cooled aluminium immediately following its solidification. This vacancy clustering has been observed using resistometric results obtained by measurements in the temperature intervals of 80 K to 300 K.

The experimental method is based on the idea of freezing the "as formed" sample while it still contains numerous vacancies. Resistivity measurements are then carried out on such samples while the temperature is slowly raised up to room temperature. The sample so treated is then cooled down to liquid nitrogen temperature once more and the measurements are repeated. The results will differ from the first set of measurements and will indicate the change in the number of scattering centers.

The experimental techniques involved the conservation of the "as formed" samples in liquid nitrogen as soon as they emerged from the quenching mill. Electrical contacts were then welded to the samples while they were still submerged in liquid nitrogen (4). The samples were then subjected to resistivity measurements while the sample holder (a massive body) was allowed to warm up.

The figure shows the results obtained with a typical sample. The temperature interval goes from 77 K to just over 200 K. The effect expected is evident since the resistance of the sample is about 16% lower in the second set of measurements. It seems that monovacancies cluster very intensively in the interval covered and that above 160 K there are few, if any, left.

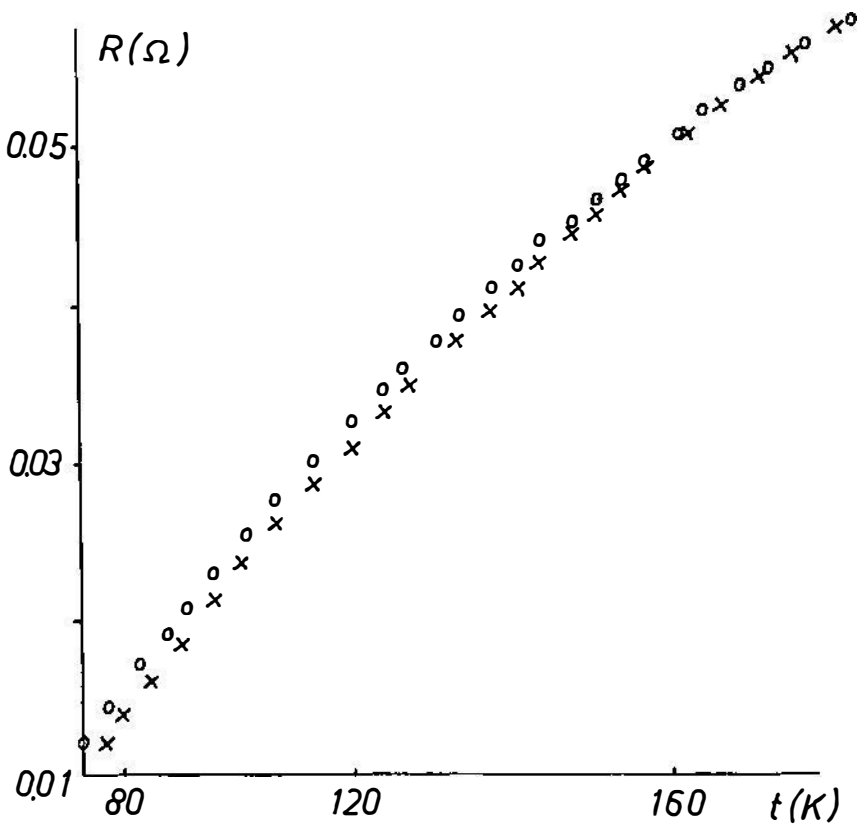


Figure caption:

Sample resistance as measured before and after warming the same room temperature. The circles represent the resistance values while going up in temperature for the first time. The crosses correspond to the repeated measurements.

References

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- 3) T. Federighi in "Lattice Defect in Quenched Metals", p 217 ed. by Cotterill et al. Acad. Press, N.Y. 1965
- 4) E. Girt, B. Leontić, A. Kuršumović and Z. Gatalo (to be published)