8. W. JOST, "Diffusion in Solids, Liquids, Gases" (Academic Press, New York, 1952) p. 218.
9. S. J. BERCOVICI and P. NIESSEN, *Trans. Met. Soc. AIME* **245** (1969) 2591.
10. K. STRÁNSKÝ and A. REK, *Hutnické Listy* **24** (1969) 734.

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Hollow Crystals of CdSe

An open-tube technique to grow hollow prisms of CdSe is reported.

Under particular conditions, hollow crystals of II-VI compounds have been deposited from the vapour phase. Up to now it is not clear which growth mechanism is responsible for this anomalous morphology, since a broad variety of experimental conditions have been invoked.

Hollow forms of ZnS were first described [1]. Then many authors referred to the growth of hollow crystals of CdS employing open-tube techniques [2-5] as well as static techniques [5-7]. In many cases the presence of impurities seems to play an important role and hollow crystals of CdS doped with Na [2, 4], Ga or In [3], or I [5] have been successfully prepared.

Here we shall refer on the growth of hollow CdSe crystals, obtained by an open-tube technique without any added impurity.

20 g of CdSe powders (99.999% pure) purchased from E. Merck AG, were placed in the middle of a 120 cm long, 2 cm-inner diameter quartz tube and kept well packed by quartz wool. The charge is heated at 1048 $\pm$ 1°C while a very rapid flow of argon (8 to 10 l/h) is forced to pass through the charge. In a colder zone of the tube (700 to 750°C) hollow prisms, like those reported in fig. 1, are deposited in about eight hours, together with platelets and solid prisms. All the crystals are grown radially from a polycrystalline crust which coats the inner walls of the tube. The size of the hollow prisms is ranging from 8 to 12 mm in length and 0.4 to 2.5 mm in width. A spectrochemical analysis did not reveal a difference in the impurity content among the various forms of crystals.

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Figure 1 Some hollow prisms (supported in wax for the photograph).

References

1. E. J. SOXMANN, *J. Appl. Phys.* **34** (1963) 948.
2. D. H. MASH and F. FIRTH, *ibid* **34** (1963) 3636.
3. J. WOODS, *Brit. J. Appl. Phys.* **10** (1959) 529.
4. C. PAORICI, *J. Crystal Growth* **2** (1968) 324.
5. *Idem, ibid* **5** (1969) 315.
6. A. DREEBEN, *J. Appl. Phys.* **35** (1964) 2549.
7. H. FUJISAKI, M. TAKAHASHI, H. SHOJI, and Y. TANABE, *J. Appl. Phys.* **2** (1963) 665.

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