What is self selecting vapour growth (SSVG)?

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Self Selecting Vapour Growth - SSVG

'Self Selecting Vapour Growth' is a method of bulk growth in a sealed capsule that is physically distinct from the more well known methods of Piper-Polich and Markov-Davydov growth. Szczerbakow has developed SSVG very extensively, both to understand the driving forces for growth and in the preparation of II-VI and IV-VI single crystals. The method deserves to be more widely appreciated.

Self Selecting Vapour Growth offers the following:

- Growth free from the walls
- A growth front at the coolest part of the crystal, not the hottest as in conventional methods
- The growth is therefore not self-limiting
- Growth is almost isothermal
- Solid solution crystals grow without distillation-like separation – exceptional compositional homogeneity is possible

Piper - Polich

- Transport to hottest end of cool growth tip
- Unseeded growth
- Contact with walls
- Poor structural quality

Markov - Davydov

- Transport to hottest end of cool seed
- Seeded growth
- Little contact with walls
- Excess elements condense out at A
- Good structural quality

Horizontal SSVG

- Transport to coolest end of cool seed
- Self – selecting seed
- No contact with walls
- Good structural quality
- Good compositional uniformity

Vertical SSVG

- As for Horizontal SSVG plus...
- Better control of boule shapes
- Continuous re-cycling of source and seed

Crystals grown by SSVG

- Exceptional compositional uniformity of solid solutions
- PL and lattice parameter used to check uniformity
- Exceptional compositional uniformity over a slice
- Works well even when binaries have disparate vapour pressures e.g. CdTe - CdS

Conclusions

- SSVG is different from other vapour growth methods
- Growth is free from the walls, self nucleating, and not self-limiting
- Exceptional compositional homogeneity has been demonstrated
- Horizontal SSVG works well for small ternary crystals
- Vertical SSVG will be best for
- Scaling up the process
- Taking advantage of continuous recycling of the source/crystal to give structural and compositional refinement
- Growing boules with controllable shapes