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In-situ SEM study of surface guided ZnSe nanowires grown by CVD

Surface-guided planar nanowires show a lot of promise for integration into practical devices [1], but that is conditioned upon understanding their synthesis in detail. In this work, we investigate the VLS growth of ZnSe nanowires by chemical vapor deposition, guided by the steps on annealed M-plane sapphire substrate [2].
We have developed a reactor compatible with SEM and, although the experimental conditions differ from the standard CVD growth, it successfully mimics the conditions in conventional furnaces while allowing us to use standard detection systems since the chamber is kept at high vacuum. SEM enables us to directly study the growth kinetics and for the first time, we can directly observe the growth behavior previously predicted by ex-situ and theoretical approaches [3]. Interestingly, we have also observed effects of the electron beam on the synthesis.

[1] Tsivion, D. et al., 2011, Science 333(6045), pp.1003-1007.
[2] Oksenberg, E. et al., 2015, Advanced Materials, 27(27), pp.3999-4005.
[3] Rothman, A. et al., 2020, Proceedings of the National Academy of Sciences of the United States of America, 117(1), pp.152-160

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