

Near-Field Synergistic Light Absorption Directs Ordered Se-Te Growth

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Assessing Effects of Near-Field Synergistic Light Absorption on Ordered Inorganic Phototropic Growth

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Scientific Achievement

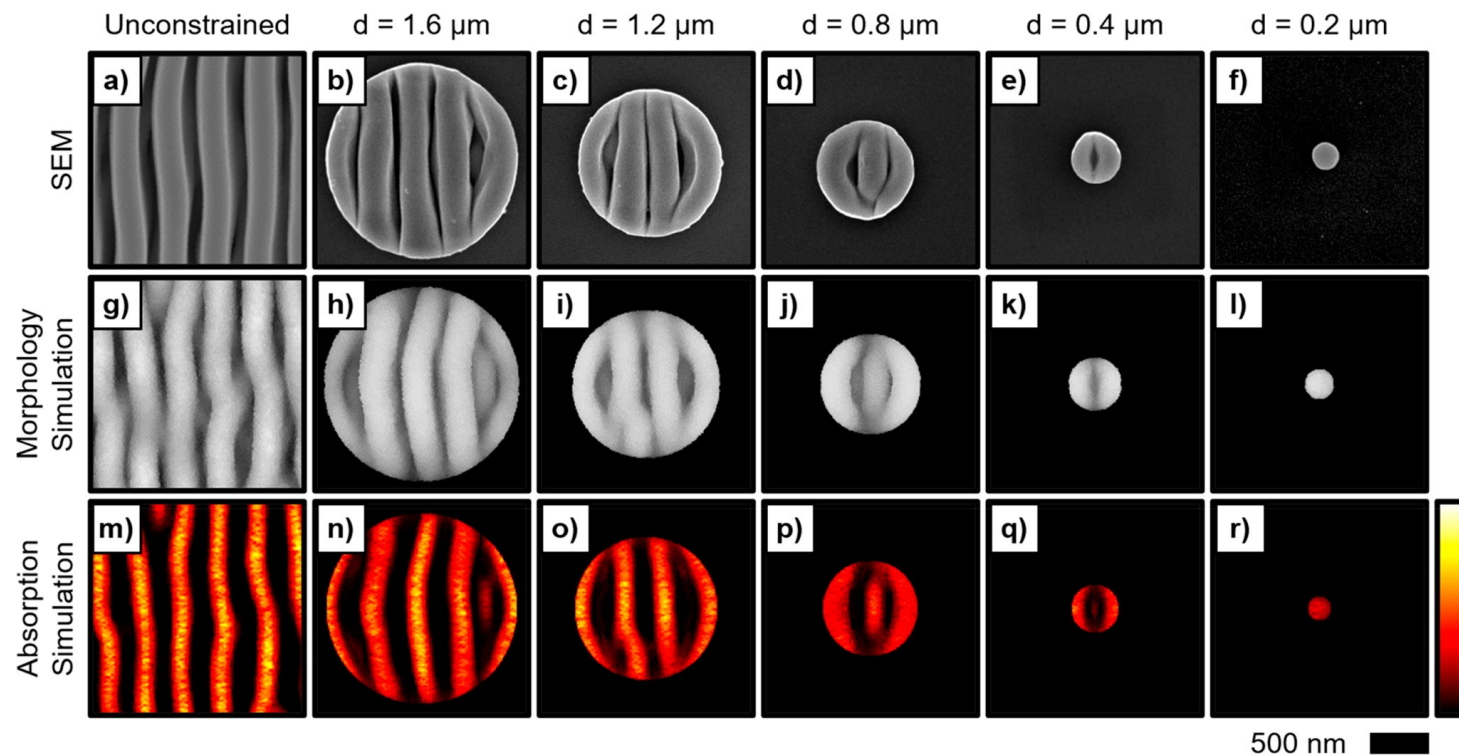
- Demonstrated spontaneous, ordered inorganic phototropic growth on wavelength length scales

Significance and Impact

- Revealed optical basis for emergent growth
- Demonstrated that self-organization is directed by cooperative light scattering and synergistic absorption

Technical Details

- Light directed electrochemical synthesis of semiconducting Se-Te with conformal illumination on a PMMA patterned substrate
- Modeling using combined simulations of light absorption (FDTD) and growth (Monte Carlo)



Representative scanning electron micrographs (SEMs) of experimentally generated Se-Te deposits, grown with linearly polarized $\lambda_{\text{avg}} = 934$ nm illumination, without spatial constraint (a) and with areal constraint to the indicated circular diameter (b-f). Computer simulations of deposit morphologies generated via an optically based growth model (g-l) under the same input illumination and geometric confinement conditions as the empirical data in the above row. Light absorption profiles of the simulated morphologies (m-r).