Nanoscale self-assembled epitaxial nucleation controlled by interference lithography

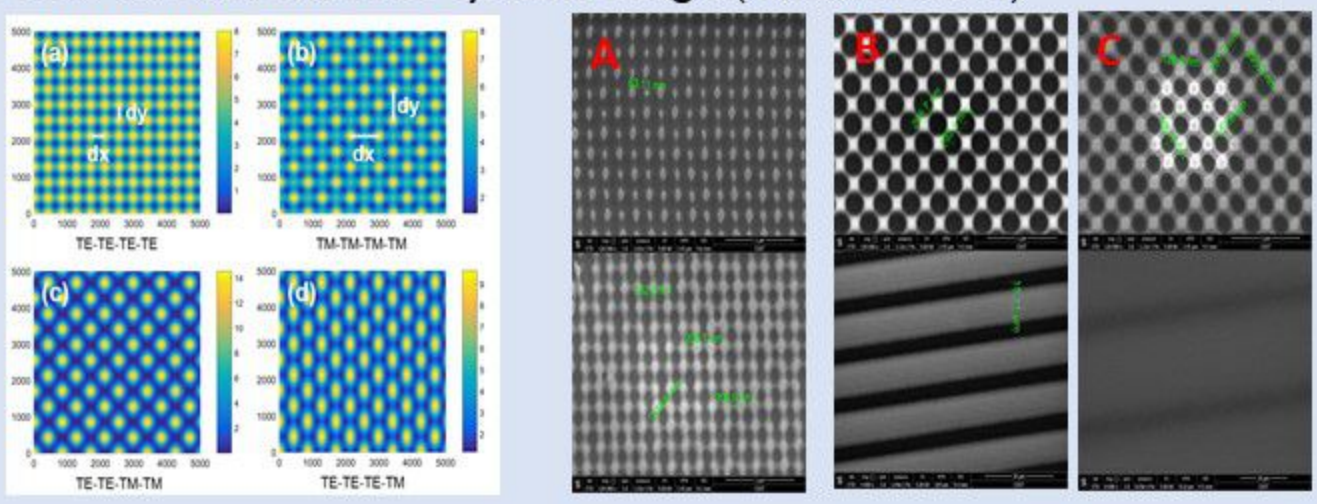
http://nanostencil-eu.com/

Funded by the EU Horizon 2020 Future and emerging technology program

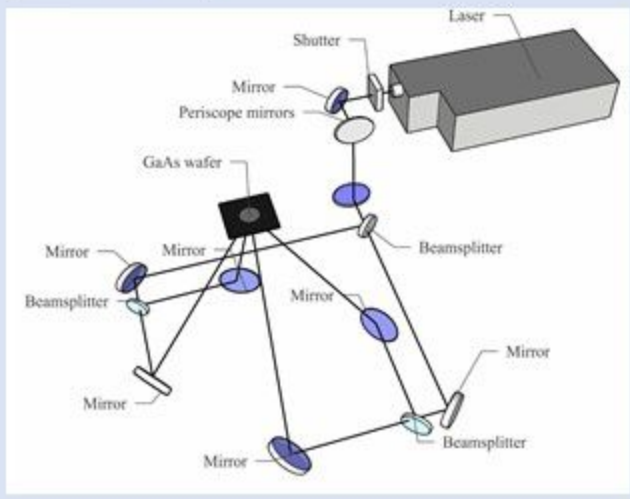
The Nanostencil uses laser interference lithography to pattern surfaces in-situ during the materials synthesis phase. The aim is to produce dense arrays of identical nanostructures of precise size, shape and composition and to apply this to diverse surface reaction methods and materials systems.

Laser interference sub-system design (Univ. Bedford)

Contact: Dayou Li (Dayou.Li@beds.ac.uk)



Laser interference simulations and right, experimental patterns in photoresist

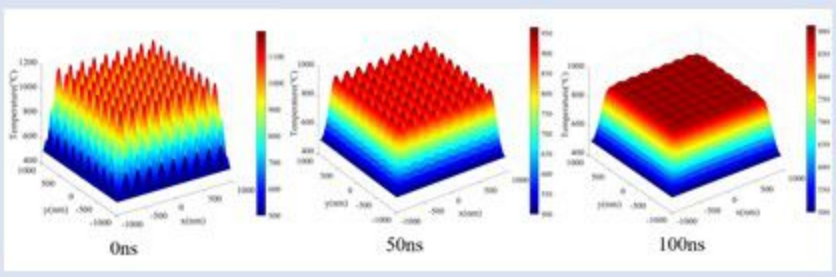


Four-beam laser interference setup for MBE growth

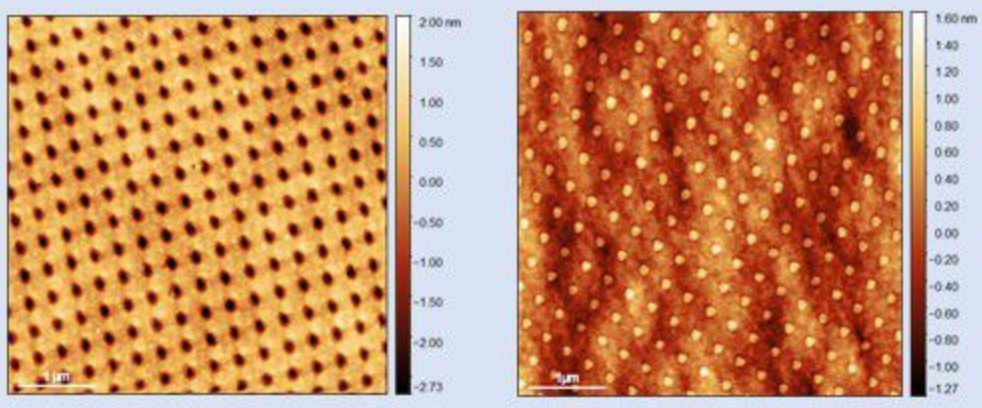
MBE growth of patterned Quantum Dots (Univ. Sheffield)

Contact: Mark Hopkinson (m.hopkinson@sheffield.ac.uk)

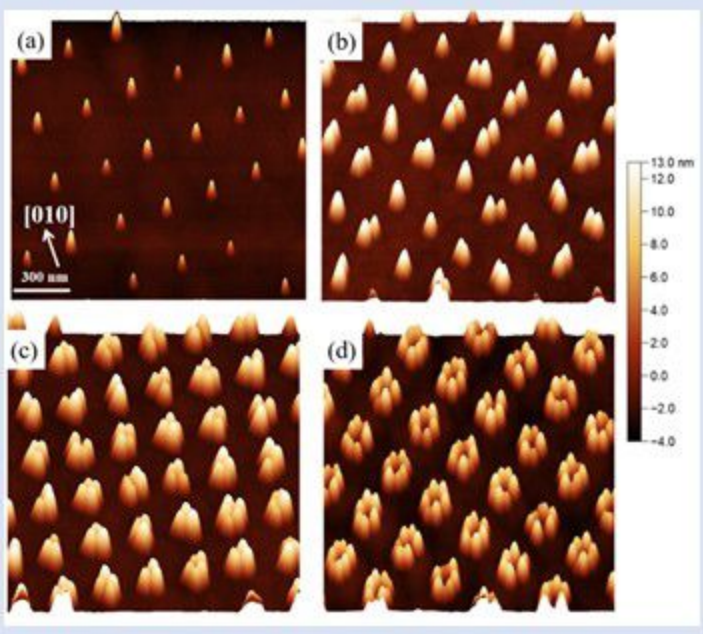
Method: Patterning in vacuum of semiconductor growth surfaces and subsequent MBE growth



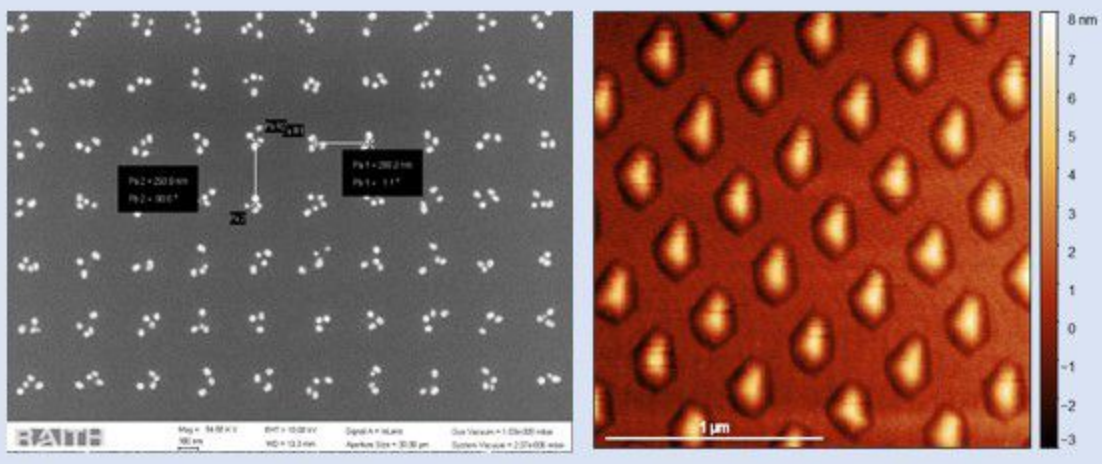
Simulation of laser interference thermal transients on a GaAs surface



Formation of GaAs nanoholes and nanoislands under different laser conditions



Single and multiple InAs quantum dots nucleated in a 300nm pitch square array

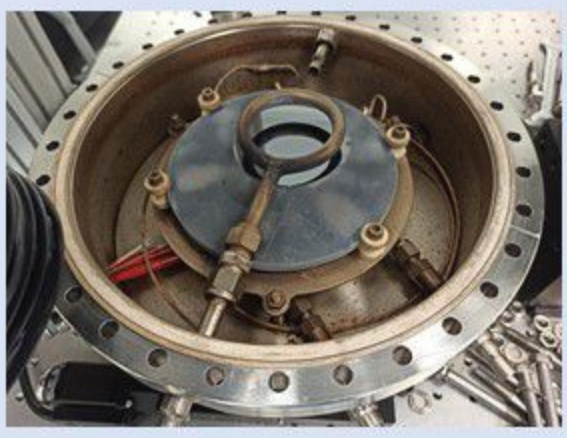


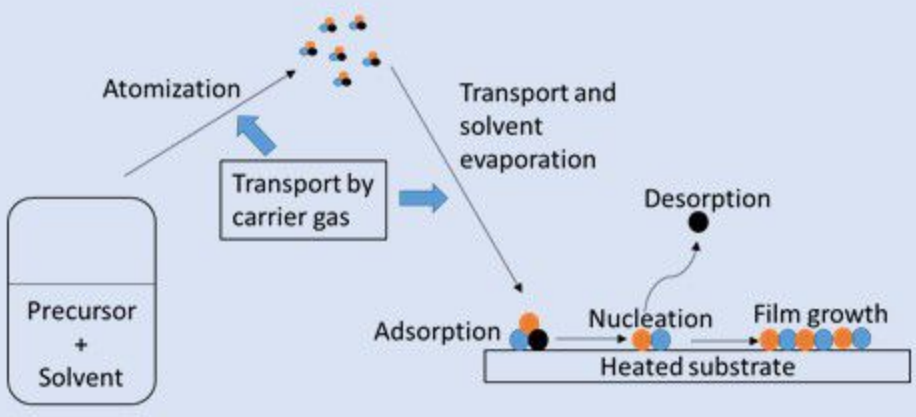
Formation of Ga droplets and the growth of large GaAs islands on Si (111)

Aerosol assisted CVD of Zinc Oxide (CEIT, San Sebastian)

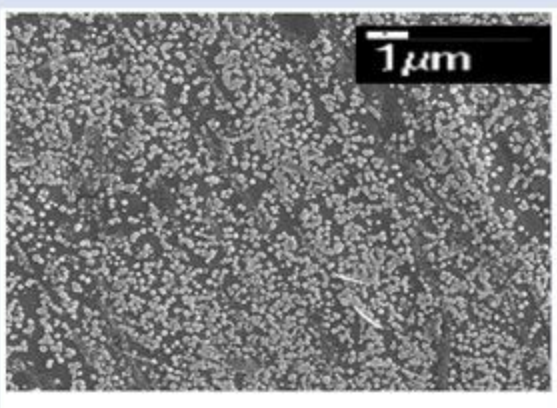
Contact: Santiago Olaizola (yolaizola@ceit.es)

Method: Decomposition of precursor and growth after multiple pulses

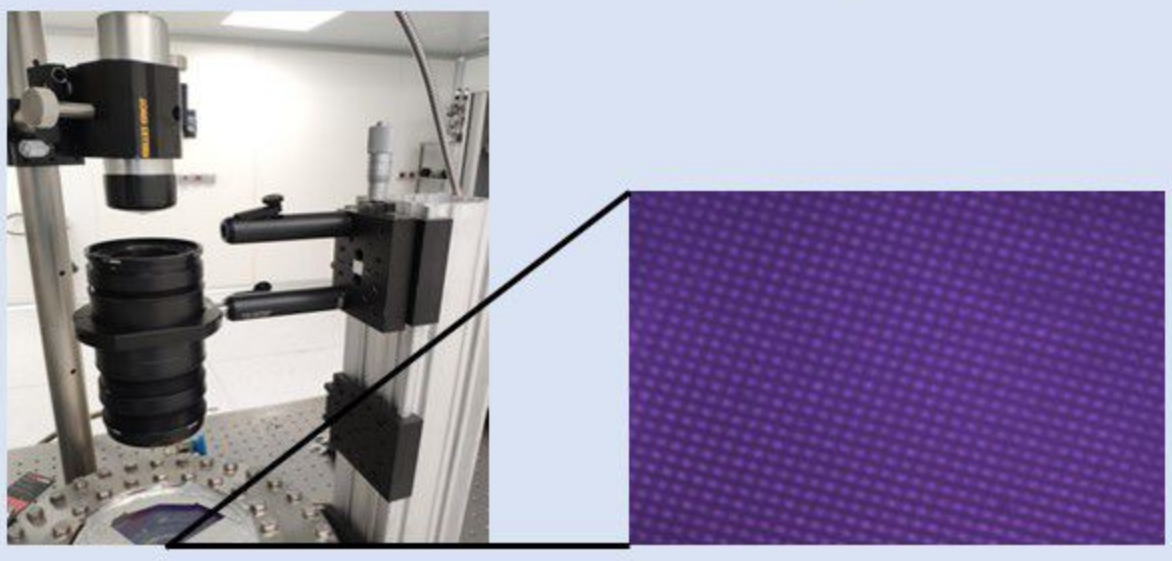




Aerosol assisted CVD reaction process schematic



Aerosol assisted CVD setup and results (unpatterned)

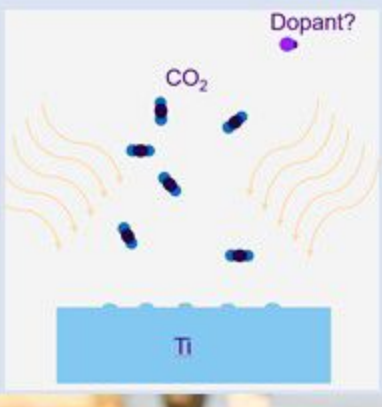


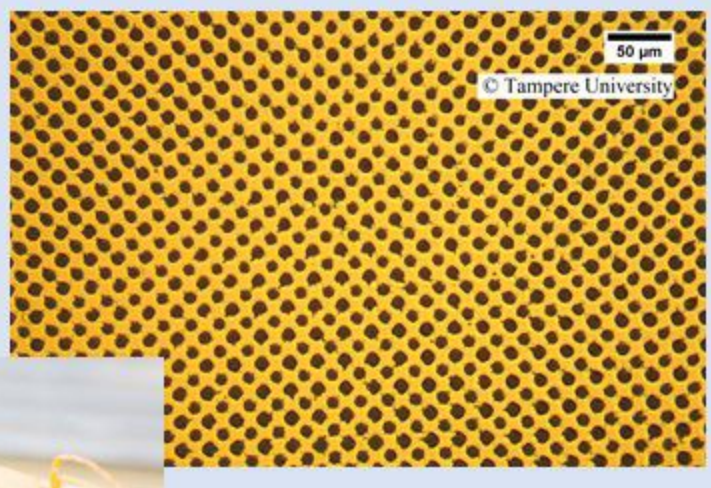
Laser Interference Aerosol Assisted CVD: experimental setup and initial patterning results.

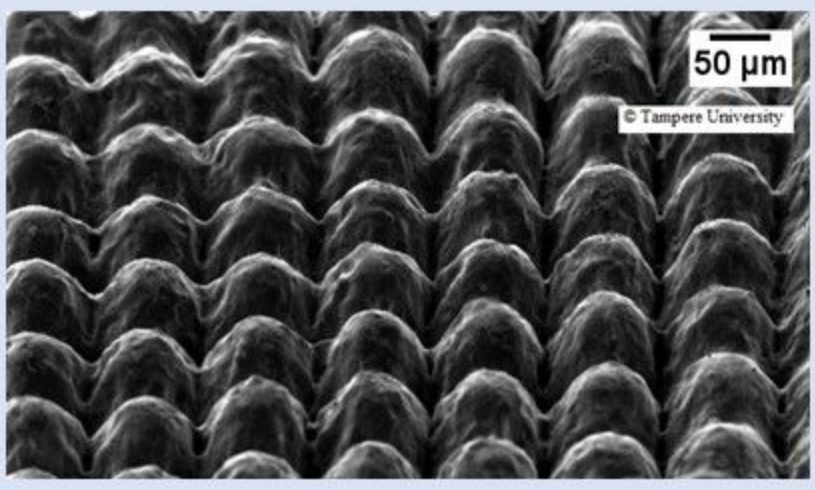
Surface reactions in supercritical $C0_2$

Contact: Erkki Levanen (erkki.levanen@tuni.fi)

Method: Local oxidation of titanium and other metal films by $SCCO_2$ after multiple pulses







Left: reaction mechanism and reaction pressure vessel. Right: Nanoholes and dome-like structures formed in titanium films by CO_2 reaction

Novel pulsed laser development for the project performed by Innolas Laser

Contact: Hani Hadba
Hani.AbouHadba@innolas-laser.com)

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