STRATOLAS TLE system

Our most versatile system for the complete TLE experience. Direct laser heating of both sources and substrates result in ultra-clean epitaxy.

Unique features

- Universal compatibility across the periodic table on every source laser
- Local source heating for ultra-pure epitaxy
- THERMALAS substrate heating up to >2800 °C
- Broad compatibility with process gases (O_3, O_2, N_2, NH_3) from UHV to beyond 10^{-2} mbar
- Rapid *in situ* source swapping without breaking vacuum

Control and throughput

- Real time process monitoring with RHEED
- Small and fast load lock
- UHV storage for up to 9 substrates and 20 sources

Class 1 laser safety

- Class 1 qualification: hermetically sealed system, integrated water cooling and safety interlocks
- Simultaneous monitoring of all laser sources with 14 camera array

Options

- Substrate sizes up to 4 inch diameter
- Between 1 and 6 source heating lasers, multiple wavelengths
- CO_2 or infrared or visible laser substrate heating
- Connection to existing vacuum clusters
- User-specific configurations for shutters, RHEED, storage, etc. available on request

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Contact

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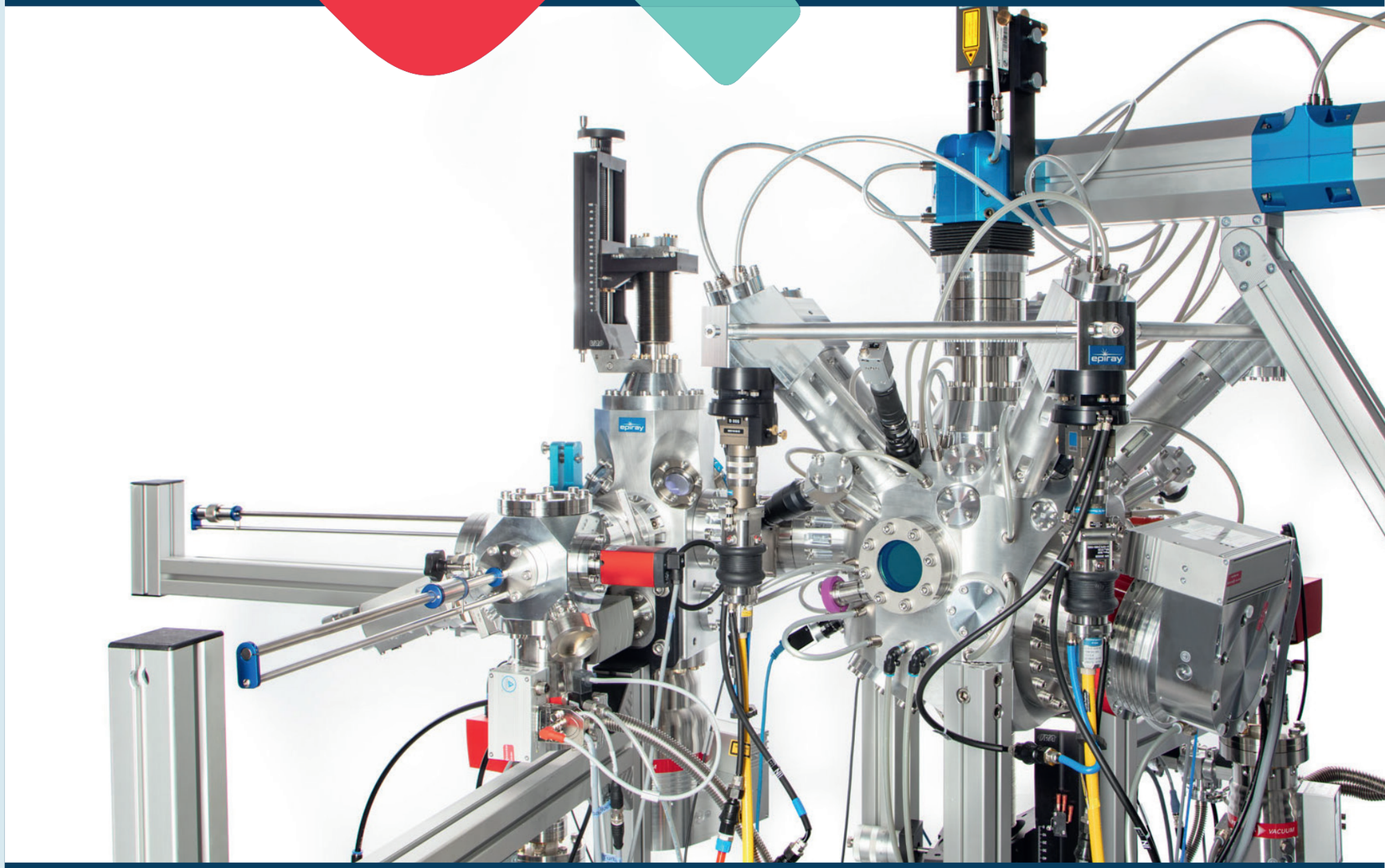
STRATOLAS TLE System



Pioneering ultra-clean heterostructures by thermal laser epitaxy

CLEAN, SIMPLE, FAST & VERSATILE

STRATOLAS TLE

Introducing the world's first materials synthesis platform specifically engineered for Thermal Laser Epitaxy (TLE).

STRATOLAS TLE systems are compact and efficient, integrating a minimalistic approach to internal vacuum components to achieve unparalleled performance.
Thermal laser heating of source material ensures universal compatibility across the periodic table, while the inclusion of our proprietary THERMALAS technology for laser-based substrate heating simultaneously unlocks substrate temperatures exceeding 2800°C.

The precise, direct thermal heating of both source materials and substrates minimizes parasitic heating, significantly reducing the risk of contamination by impurities and enhancing the purity of the epitaxial films.
The systems can operate across a hugely expanded thermodynamic parameter space, unlocking new realms of possibilities for the synthesis of ultra-clean epitaxial thin films.

Next-generation epitaxy

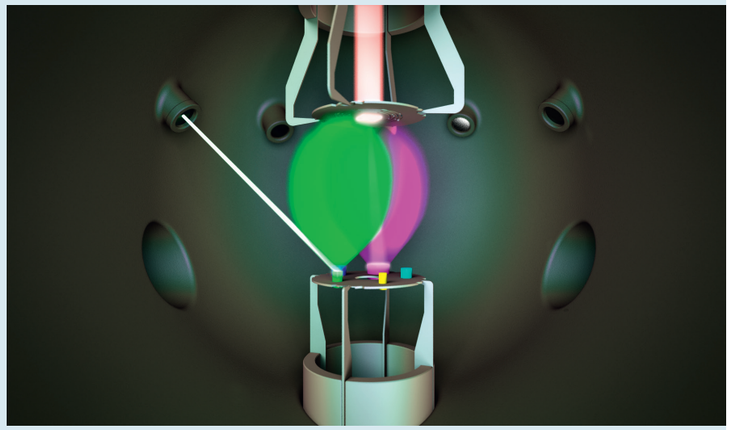
Rapid surface preparation

STRATOLAS TLE streamlines oxide substrate preparation through high-temperature annealing in the growth chamber, negating the need for chemical treatments, backside coating, or ex situ annealing. This quick, efficient process enhances substrate purity and readiness for epitaxial growth.

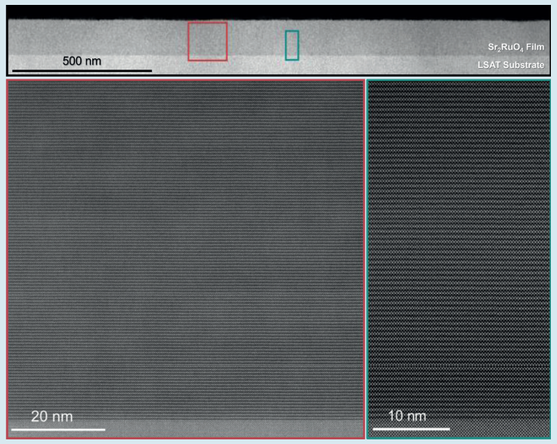
Dynamic control

STRATOLAS TLE's laser heating enables rapid thermalization of source elements and substrates, allowing instant thermodynamic phase control during deposition without the need for physical shuttering. High temperatures and high growth rates provide access to otherwise impossible adsorption-controlled growth regimes.

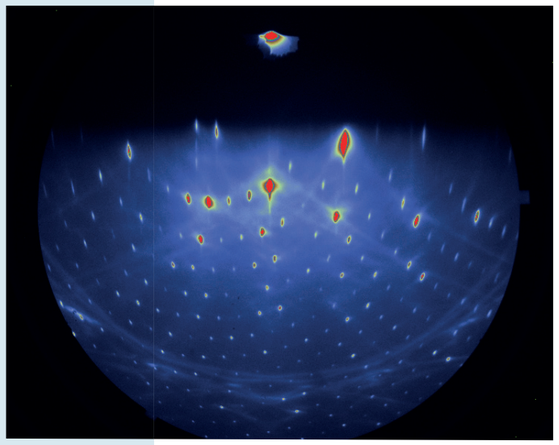
Explore novel growth regimes!



Artist rendition showing the interior of a STRATOLAS TLE system during growth.
Image courtesy of MPI-SSR Solid State Quantum Electronics.



HAADF image of a 125 nm-thick superconducting Sr_2RuO_4 film grown via TLE. High temperatures enable defect-free, phase-pure films over large length scales.
Image courtesy of MPI-SSR Solid State Quantum Electronics and Stuttgart Center for Electron Microscopy.



Sapphire surface after thermal preparation at 1700 °C. The observation of 20 Laue circles indicates the high crystal quality of the surface.
Image courtesy of MPI-SSR Solid State Quantum Electronics.

Thermal Laser Epitaxy

Thermal Laser Epitaxy (TLE) harnesses the power of laser beams to thermally evaporate single-element sources. Fine control over laser power densities across a huge dynamic range allows for direct heating and evaporation of an expansive range of elements from the periodic table. As a result, TLE laser sources offer unparalleled versatility, from the challenging refractory metals such as ruthenium (Ru), iridium (Ir), tungsten (W), or platinum (Pt), to elements with high vapor pressure like strontium (Sr), selenium (Se), sulfur (S), and arsenic (As).

TLE prioritizes ease of operation and efficiency; both substrates and sources can be seamlessly exchanged *in situ* without breaking vacuum. No crucibles are required for non-molten sources, reducing impurities from hot crucible degassing. The elimination of filament heaters from the vacuum chamber significantly simplifies the system's architecture and minimizes the risk of downtime due to ultra-high vacuum (UHV) component failure. This also broadens the compatibility of TLE with various process gases, allowing stable operation at pressures above 10^{-2} mbar even with reactive gas sources such as ozone or ammonia.

- Universal source compatibility with laser heating
- High growth rates, huge dynamic range for flux conditions
- Ultra-high purity
- *in situ* source and sample transfer
- Substrate temperatures up to 2800 °C
- High throughput, rapid ramp rates (400 °C/s)
- Compatibility with high pressures, reactive atmospheres