Date: Feb. 24th
Time: 4 pm-5 pm (Japan time)
URL: https://zoom.us/j/95051162403?pwd=RWE5YnNCQWtRb1VoeFUyTzl4UnluQT09

Speaker: Dr. Hans Boschker
Title: Laser-Light for Epitaxy
Language: English

Abstract:
Complex-oxide heterostructures are a leading example of quantum-matter heterostructures that open a new arena of solid-state physics. For the scientific development of this field and for a range of potential applications, the growth of high-purity heterostructures is required. We have developed a new thin-film deposition technique that is especially suited to the growth of oxide heterostructures with atomic precision. Thermal laser epitaxy (TLE) uses chemical elements as sources which are evaporated with continuous-wave lasers [1]. The lasers' virtually arbitrary power density allows for the evaporation of almost all elements of the periodic table in the same setup. This is demonstrated by showing elemental metal films of a large range of elements; from high-vapour-pressure elements like S and Bi to low-vapour-pressure elements like W and Ta. I will discuss the benefits of thermal laser epitaxy for high-purity deposition of complex-oxide materials and heterostructures with almost all elements from the periodic table. Compared to existing methods such as molecular beam epitaxy and pulsed laser deposition, TLE is clean, simple, fast and versatile. TLE will open new possibilities for research and applications because it will enable higher quality heterostructures and it will expand the range of materials used in high-quality heterostructures. Furthermore, I will present results of a new substrate heater that is based on a ~10 μm laser [2]. This laser light is directly absorbed by oxide crystals and therefore allows for a heating system that is ultra-clean, has very fast ramp rates and can reach extremely high temperatures.

Reference
[1] Film Deposition by Thermal Laser Evaporation, W. Braun and J. Mannhart, AIP Advances 9, 085310 (2019).
[2] In situ Thermal Preparation of Oxide Surfaces, W. Braun, et al., Appl. Phys. Lett. Mater. 8, 071112 (2020).

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