IQCLSW

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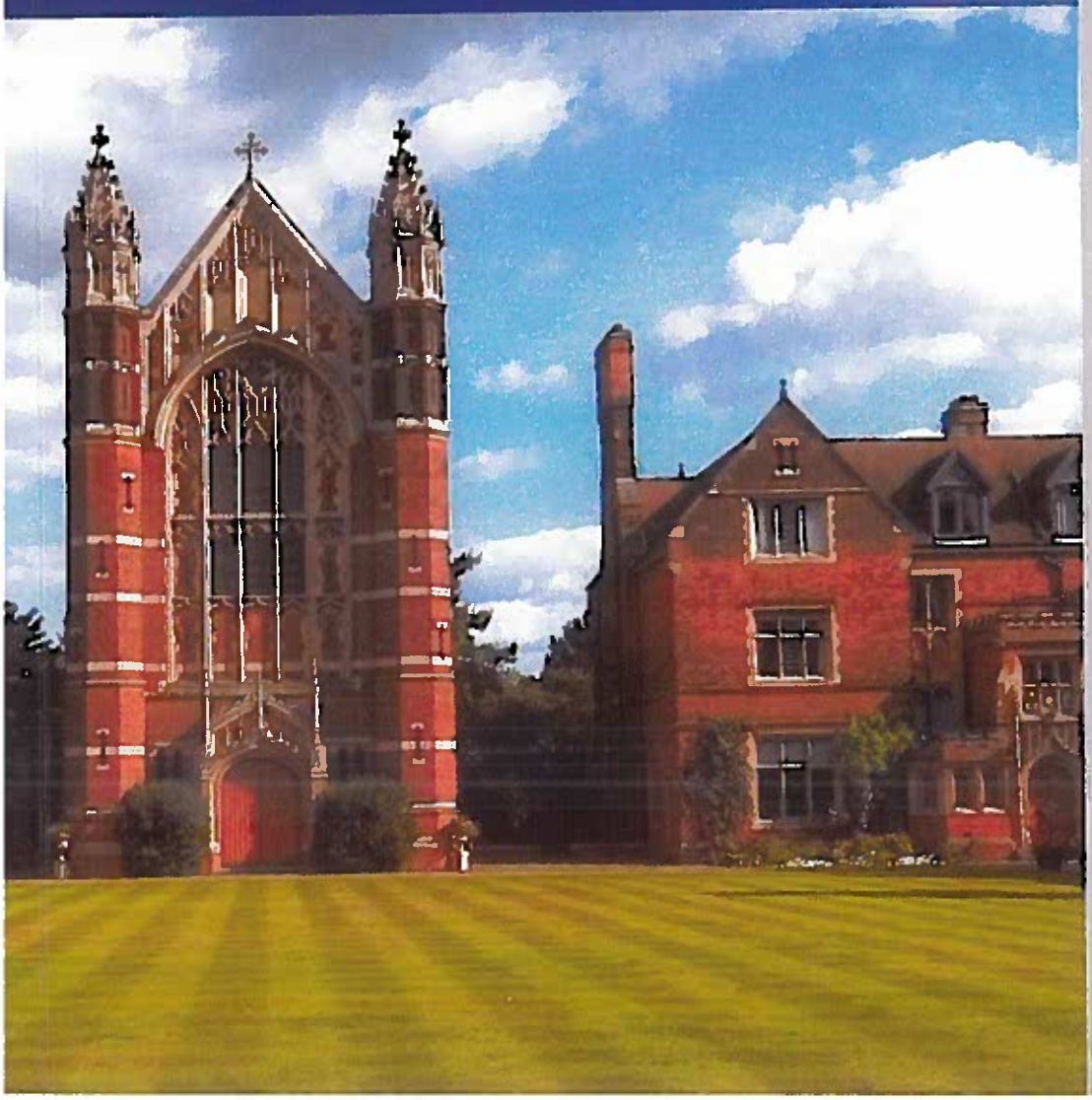

Material systems for QC Devices: Design, Growth, and Fabrication

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Quantum cascade lasers (QCLs) have become powerful, versatile and desirable light sources, emitting in a wide range from the mid-infrared to the terahertz spectral region. Therefore, such lasers are suitable for many applications in science, medicine and industry. In spite of the developments during the last 20 years in this lively field there is still room for further improvement in terms of materials, material combinations, and growth. In addition, various cavity concepts have been developed, partly exploited, and might open broader applications and novel markets. This talk will cover both aspects, growth and processing of QC lasers.

From a growth perspective symmetric quantum cascade laser active regions can be used to study material and growth related effects on the device performance. GaAs, InAs and InGaAs-based heterostructures will be discussed in terms of material induced imperfections like monolayer fluctuations (InAs THz QCs), roughness scattering (e.g. InGaAs/GaAsSb), or dopant diffusion during epitaxial growth (GaAs/AlGaAs).

Apart from QCLs the field around QC devices also includes quantum cascade detectors (QCDs) and the combination of QC lasers and detectors. Combined laser/detector single chip systems are asking for additional design rules and processing recipes. Various cavity concepts like facet emitting, surface emitting, and substrate emitting lasers and their detector counterparts will be discussed.