**Th1A5: Lasers**

<table>
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<th>Time:</th>
<th>5/31/2018, 08:30 AM - 10:00 AM</th>
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<tbody>
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<td>Room:</td>
<td>Salon M (Samberg Conference Center, 7th floor)</td>
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<td>Chair:</td>
<td>Nelson Tansu (Lehigh University, United States)</td>
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</tbody>
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**Th1A5.1**

**Mid-Infrared Quantum Cascade Lasers and Applications**

**08:30 AM**

*Claire Gmachl (Princeton University, USA)*

**INVITED**

Abstract not available.

**Th1A5.2**

**Evolution of Material Systems for THz Quantum Cascade Lasers**

*Hermann Detz (TU Wien; Austrian Academy of Sciences, Austria); Martin Kainz, Sebastian Schönhuber, Tobias Zederbauer, Donald MacFarland, Michael Krall, Christoph Deutsch, Martin Brandstetter, Aaron M Andrews, Werner Schrenk, Karl Unterrainer and Gottfried Strasser (TU Wien, Austria)*

THz Quantum cascade lasers (QCLs) are compact coherent sources with designable emission wavelengths between 30 μm and 3 mm. Their main hurdle for the integration into optical systems is the limited operating temperature < 200 K. This work focuses on low-effective mass material systems based on InGaAs and InAs quantum wells, which provide higher optical gain compared to the commonly used GaAs/AlGaAs heterostructures. With InAlAs and GaAsSb, we compare two prospective barrier materials for InGaAs-based active regions, which allow to identify the optimum balance between effective mass, barrier height and thickness. Currently, InGaAs/InAlAs and InGaAs/GaAsSb THz QCLs reach operating temperatures of 155 K and 142 K. We furthermore report on the first operational InAs-based THz QCLs, which still require in-plane confinement by a magnetic field due to the early stage of development. We will benchmark the different material systems for THz QCLs, present state-of-the-art results and outline potential future directions.