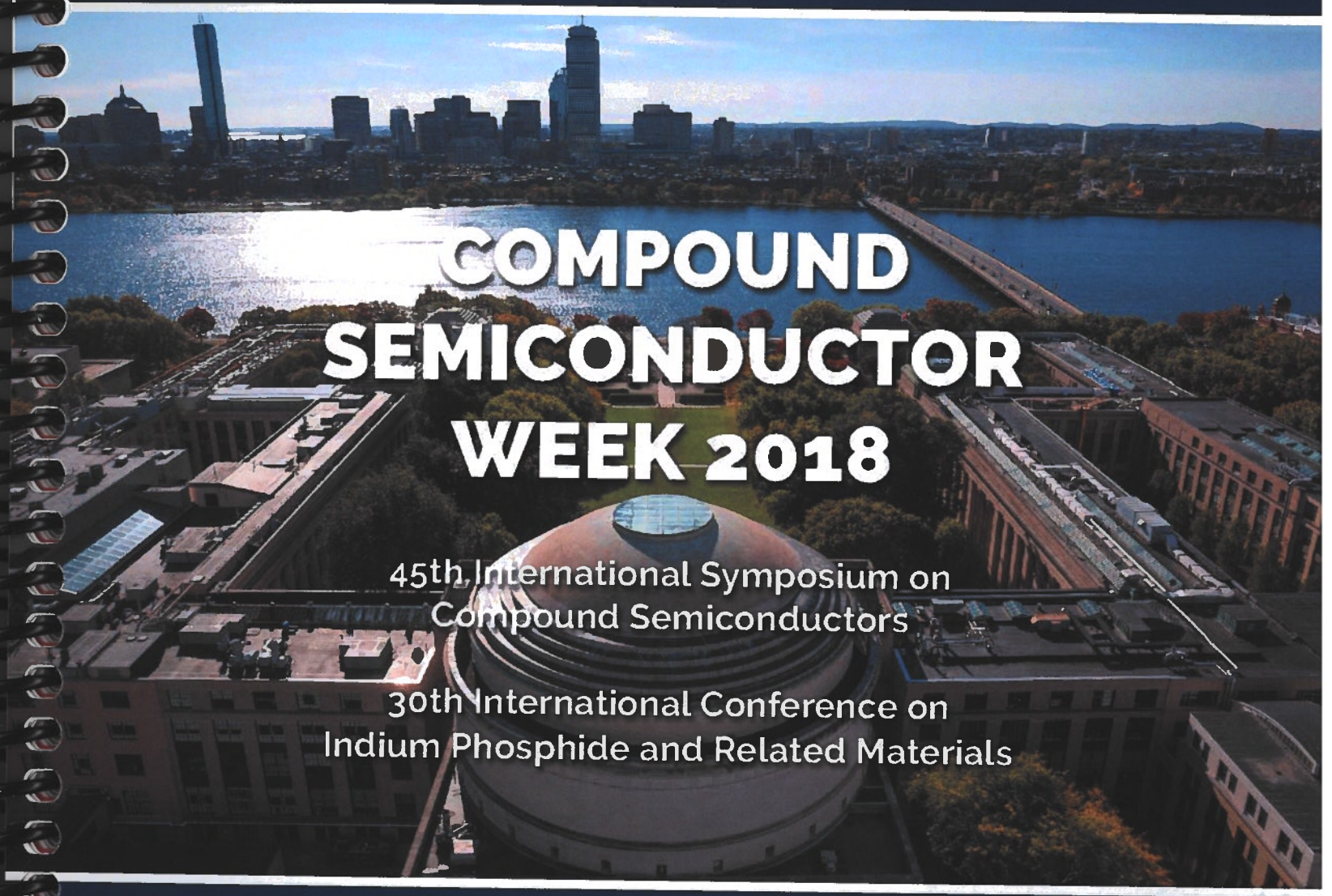
Cambridge / Boston, Massachusetts

CSW2018



COMPOUND SEMICONDUCTOR WEEK 2018

45th International Symposium on Compound Semiconductors

30th International Conference on Indium Phosphide and Related Materials

Massachusetts

CSW2018

IEEE

Th1A5: Lasers	
Time:	5/31/2018, 08:30 AM - 10:00 AM
Room:	Salon M (Samberg Conference Center, 7th floor)
Chair:	Nelson Tansu (Lehigh University, United States)

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**

09:00 AM *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)*

Salon M

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.