NANOSCIENCE AND NANOTECHNOLOGY PROGRAM

Isaac Hernández-Calderón

Research Interests

- Epitaxial growth (MBE, ALE, SPBE) of II-VI semiconductor thin films, heterostructures and nanostructures.
- Optical properties (photoluminescence, photoreflectance, Raman, photoconductivity, others).
- Electrical properties (Hall effect, resistivity, I-V, etc.).
- Structural properties (electron diffraction, electron microscopy, HR-XRD, etc.).
- Physics of surfaces and interfaces (ARUPS, XPS, AES, EELS)

Dr. Isaac Hernández-Calderón is professor (3E) in the Physics Department of Cinvestav, associated to (and co-founder of) the Nanoscience and Nanotechnology Program and Coordinator (and co-founder) of the Advanced Laboratory of Electron Nanoscopy (LANE). He graduated at the School of Physics and Mathematics (ESFM-IPN). He obtained a MSc degree at the Physics Dept. of Cinvestav and PhD at the State University of Campinas (Unicamp - Brazil). He spent a three year postdoctoral stay at the Max Planck Institute for Solid State Physics (Stuttgart).

His research activities on semiconductor characterization and growth by molecular beam epitaxy (MBE) started in 1982 at the Max-Planck Institute with pioneering work on the growth of thin and ultra-thin epitaxial α-Sn films. During the late 80's he was active user of the Synchrotron Radiation Center of the Univ. of Wisconsin-Madison (first Mexican working in a synchrotron). He started the first MBE laboratory in Mexico in 1995. He developed in his laboratory a method for the layer-by-layer growth of II-VI semiconductor alloy thin films (SPBE). He has published around 160 papers and 4 book chapters, edited 10 proceeding books, given around 70 invited talks in national and international meetings. He has supervised 5 postdocs and graduated 17 M. Sc. and 11 Ph. D. students (three more very soon). He has been two times head of the Physics Dept. He is member of the NAMBE board of directors and has chaired many international conferences. He has been president of two scientific societies. He is the Chair of the Intl. Conf. MBE (2021 Pto. Vallarta).

Selected Honours and Awards

- SNI 3 since 1999, member since 1984.
- Alexander von Humboldt research Award (1982-83)
- 1st. place award in the Toshiba-IPN Contest, 2003.
- Member of the MBE Intl. Advisory Board (since 2019)

- **Selected Funding**
- Conacyt, NSF

Recent projects: Design, epitaxial growth, and characterization of semiconductor nanostructures

- Growth and characterization of fractional monolayer quantum dots (FMQDs) of CdSe/ZnSe.
- Study of the excitonic properties of coupled and uncoupled double and triple quantum well systems.
- Design, growth, and characterization of quantum well heterostructures with non-conventional potential profiles.
- Design, growth, and characterization of type I quantum well heterostructures with type II active regions.
- Study of Cd diffusion in ZnCdSe/ZnSe heterostructures induced by thermal treatments.
- Growth and characterization of photovoltaic ZnSe/GaAs heterovalent heterostructures with and without quantum well insertions.