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Dr. Pierre-Philippe Beaujean
Professor

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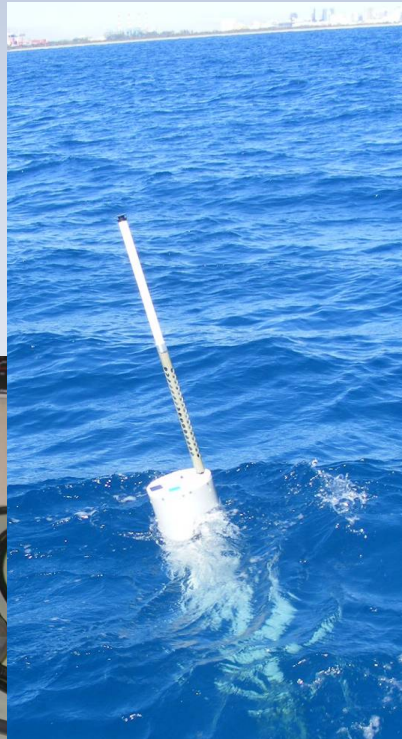
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Research Interests

- Underwater Acoustic Communication Technology.
- Synthetic Aperture Sonar Imagery.
- Marine Magnetic Field Processing for Unmanned Underwater Vehicle Operations.
- Ocean Energy for Autonomous Surface Vessel Operations.
- Propagation of Ultrasounds in Materials.

Pierre-Philippe Beaujean
Ph.D, Professor
pbeaujea@fau.edu



Gateway Buoy (left) and Electronics (right) for Real-Time Communication with Unmanned Underwater Vehicles

Current Research Projects

- Load Cell Monitoring in Marine Structures using Underwater Acoustic Communications (SANDIA, NREL)
- Adaptive Sensing in Challenging Underwater Environments using Multiple Autonomous Vehicles (ONR)
- Marine Magnetics (ONR)
- Low-Flow Marine Turbine for Small ASV (DOE)

Pending Research Projects

- Corrosion Measurements in Reinforced Concretes using Ultrasounds (US DOT)



Dr. George Cai
Professor

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Dr. Leif Carlsson
J.M. Rubin Foundation Professor

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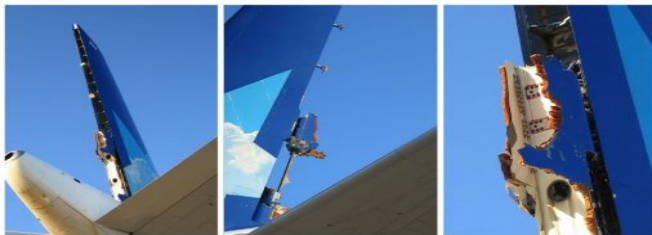
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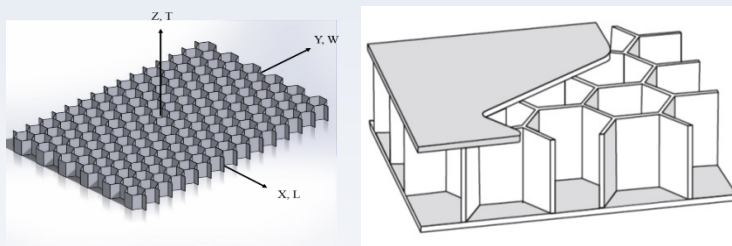
Graduate Student: Mohammad Tauhiduzzaman
Supervisor: Leif A. Carlsson

Study of Environment Effects on Sandwich Structural Capabilities by Analysis and Testing

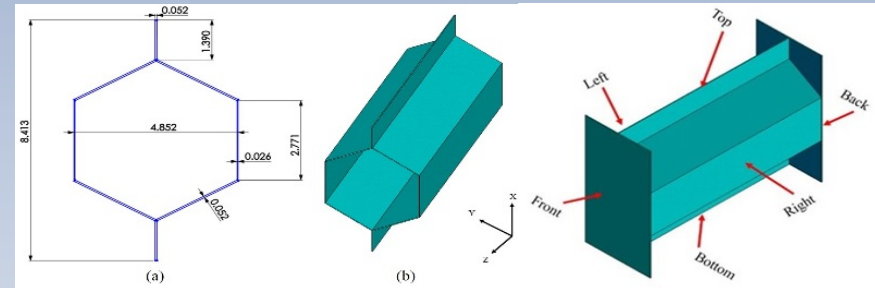
- Develop methods to predict the crack growth
- Fracture analysis of honeycomb sandwich
- Mode I and mode II fracture tests
- ASTM standardization and CMH-17 Handbook



Airbus A310-300



Honeycomb core sandwich



Homogenization of honeycomb sandwich



Fracture tests on honeycomb sandwich

Research Outcome

- Develops methodology of homogenization
- Identify mechanical properties to face/core disbonding
- Data reduction methodologies for fracture tests
- Fracture and failure analysis to develop design

Funded by : FAA/NIA

Graduate Student: Raul Vidal
Supervisor: Leif A. Carlsson
Sarah E. Du

Advancement of Fundamental Composite Research using Established and Innovative Experimental Methods and Analysis

- **Development of Experimental Methods for Fiber/Matrix Testing and Analysis**
- **Composite manufacturing using advanced nano and microfabrication technology**
- **Composite Micromechanics Behavior**
- **Scale-up Effects in Composites**
- **Low Fiber Volume Fraction Composite Behavior**
- **Moisture Degradation**

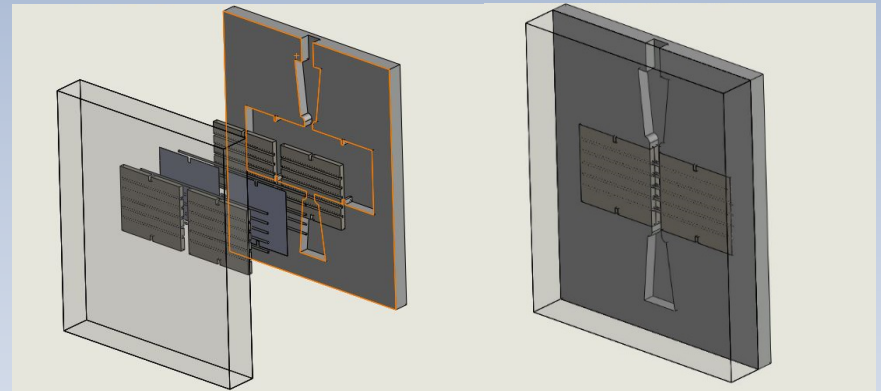


Figure 1: Transverse Tension Multiple Fiber (TTMF) Composite Sample Mold. For Controlled Placement of Fiber for Low Fiber Volume Fraction Study

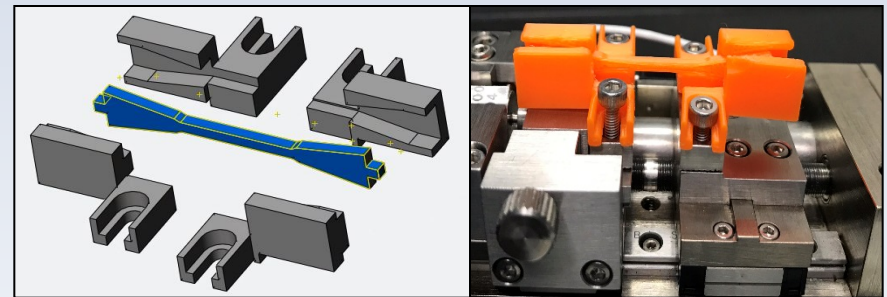


Figure 2: Design and Prototyping (Additive Manufacturing) of Microtester Adapter for in-situ SEM Tension Test of TTMF.

Research: Scale-up Effects on the Fiber/Matrix Interface Strength of Glass/Epoxy
Funded by :

- NSF
- JM Rubin Foundation
- Florida Education Fund (McKnight Fellowship)

Graduate Student: Mustafa O. Ayanoglu
 Supervisors: Leif A. Carlsson
 Sarah E. Du

Moisture Degradation of Mechanical Strength of Polymer Matrix Composites with Voids

- Manufacture fiberglass/epoxy panel.
- Develop multiscale modeling methodology for predicting water absorption.
- Analyze the initiation and Fiber/Matrix debonding of glass/epoxy.

Funded by : NSF

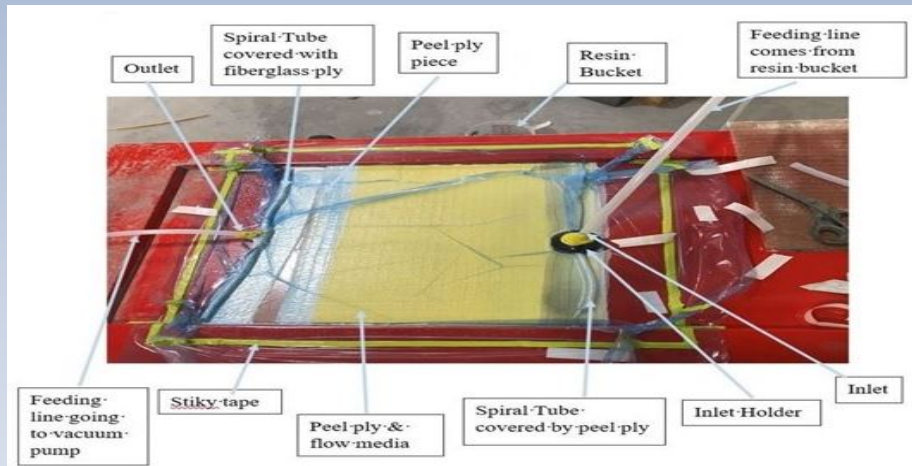


Figure 1: Manufacturing fiberglass/epoxy panel layout.

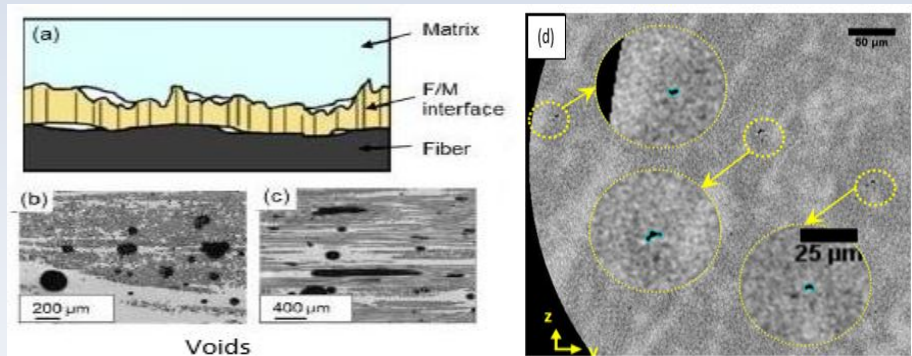


Figure 2: F/M interface region and voids in composite materials. a) Insufficient bonding between fiber and matrix in unidirectional composite materials causes interface voids. b) and c) Microscopic images of voids. d) Micro-CT image showing structure of extended voids in a unidirectional composite.



Dr. Oscar Curet
Associate Professor

EW 172

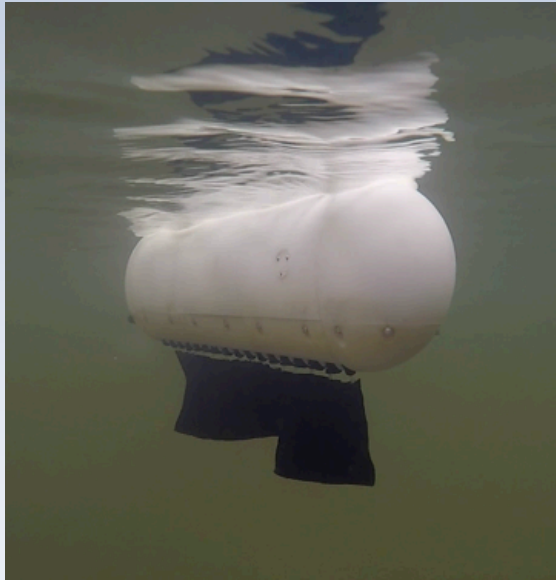
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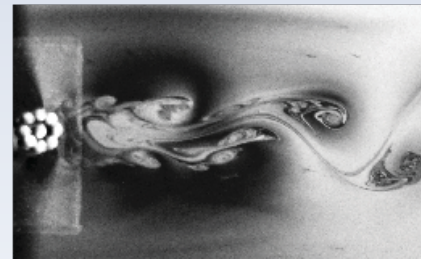
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Research Interest: Bio-Fluid Dynamics

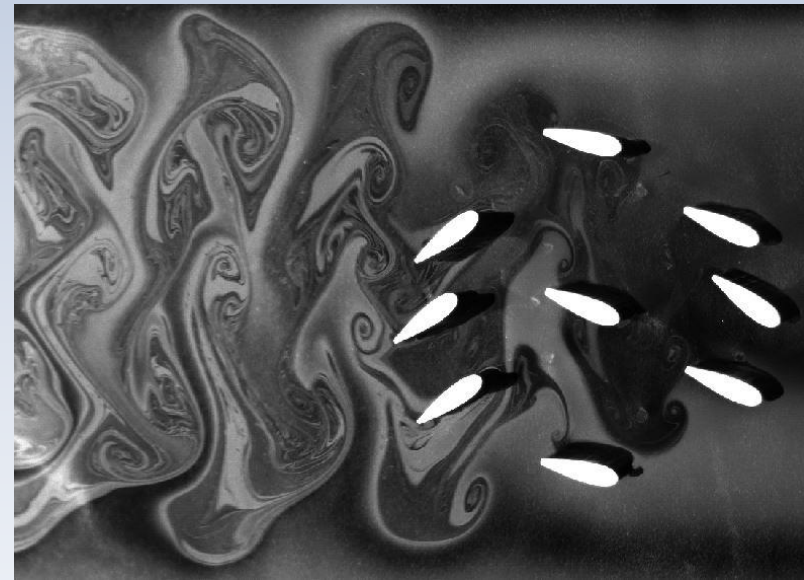
Marine Propulsion



Energy Harvesting & Coastal Preservation



Collective Swimmers



Current & Pending Research Projects

- Modeling and Control of Undulating-Fin Underwater Vessels in Close Formation (NSF)
- NSF I-CORP
- Shark Olfaction



Dr. Manhar Dhanak
Department Chair, Professor and
Director of SeaTech

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Dr. Sarah Du
Associate Professor

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Research Interests

- Microfluidics for live cell analysis
- Biosensors, point-of-care devices
- Cell biomechanics and biophysics
- Organ-on-a-chip

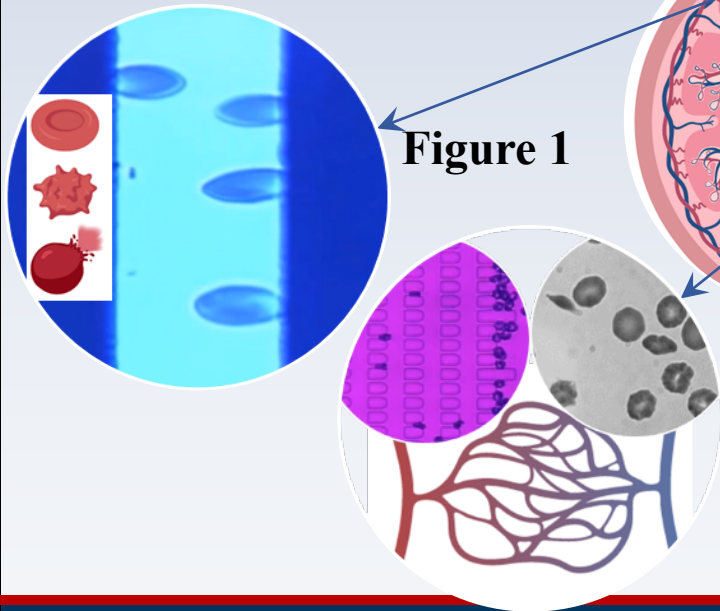


Figure 1

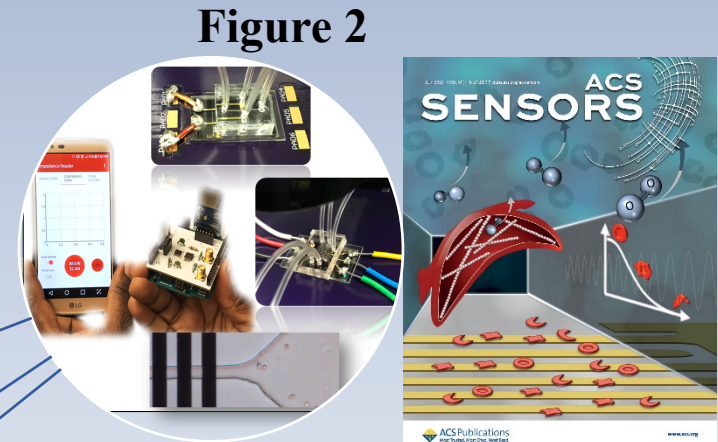


Figure 2

Current & Pending Research Projects

Sickle cell disease diagnosis and monitoring (NSF, NIH)

Placental malaria (NIH)

- Biomechanics of blood cells (NSF)
- Water absorption/mechanics in composites (NSF)
- Microfluidics for neuron regeneration (NIH, PI – Engeberg)



Dr. Isaac Elishakoff
Distinguished Research Professor

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Dr. Erik Engeberg
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Dr. Kevin Kang
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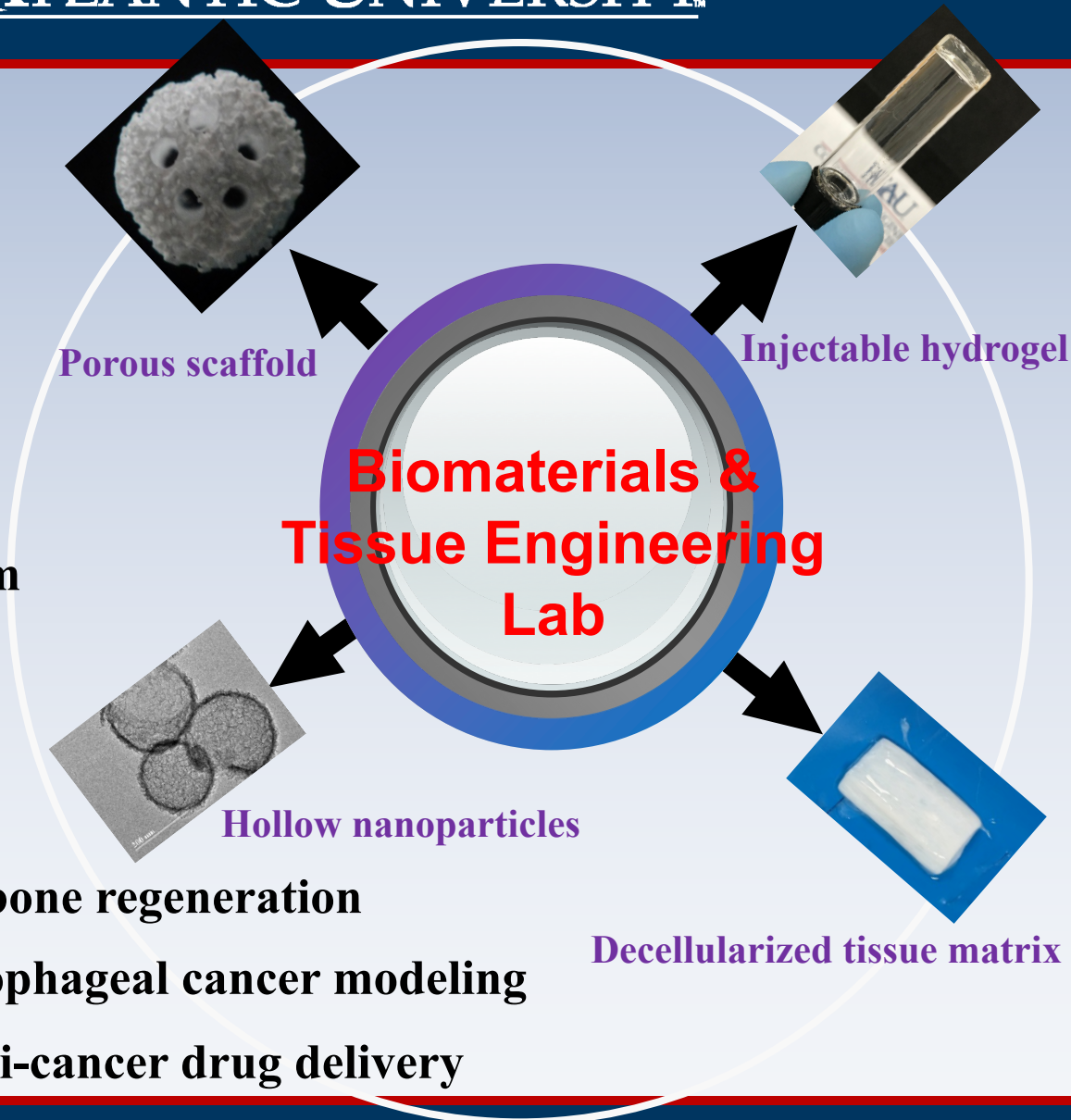
Yunqing (Kevin) Kang
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Research Interests

- Biomaterials
- Tissue Engineering
- Targeting Drug Delivery System

Current Research Projects

1. Porous scaffolds for cranial bone regeneration
2. Decellularized matrix for esophageal cancer modeling
3. Hollow nanoparticles for anti-cancer drug delivery





Dr. Mike Kim
Assistant Professor

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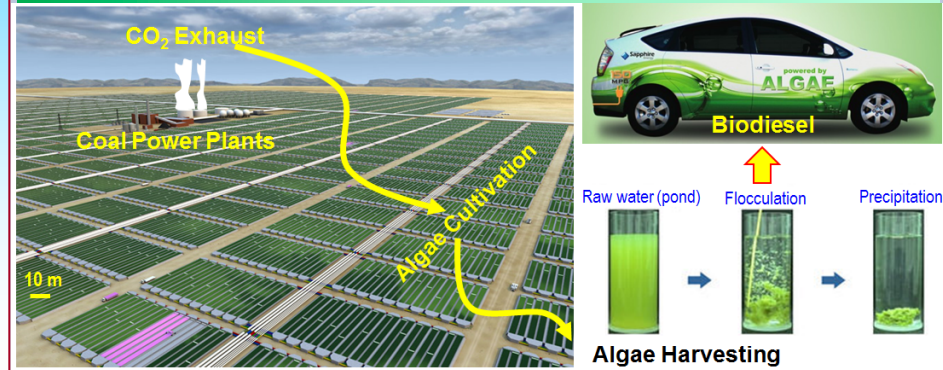
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Mike Kim (kimm@fau.edu)

Research Interests

- Thermal Management (Boiling)
- Energy and Environmental Research
- Carbon Capture & Sequestration
- Biofuel (Microalgal Biodiesel)
- Bubbles & Droplets

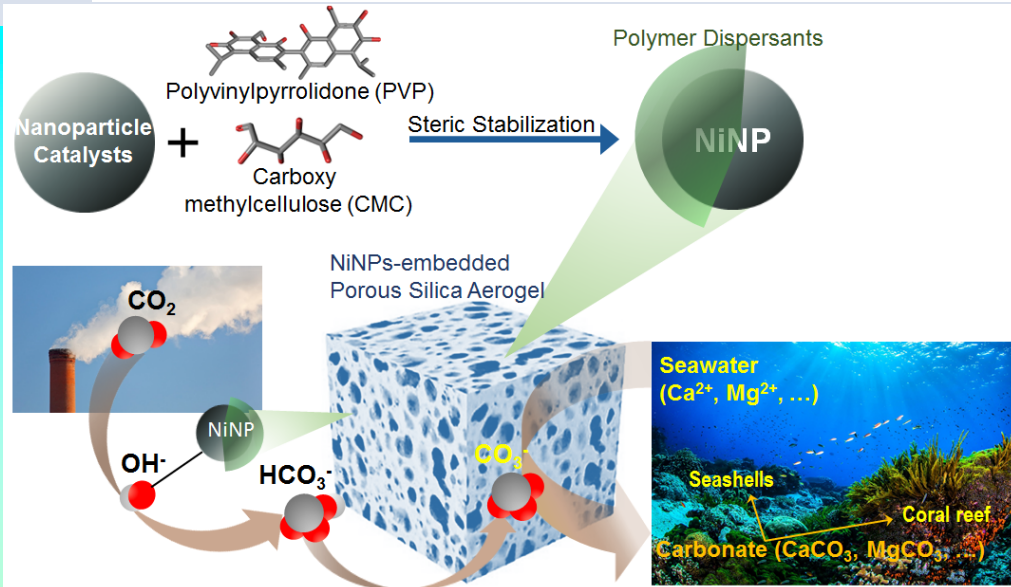
Microalgal Biodiesel Production



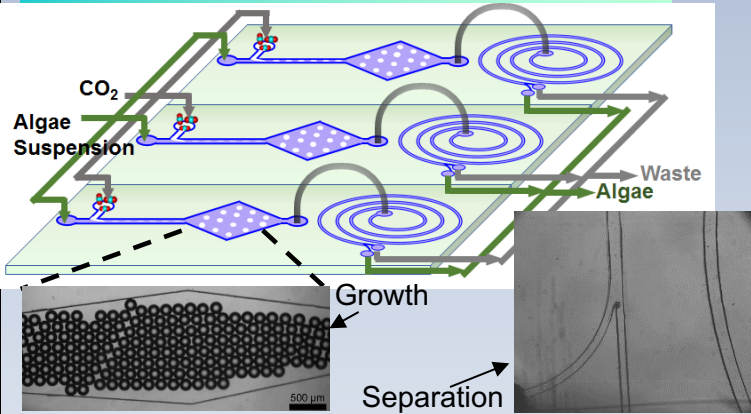
Global Warming & Sea Level Rise



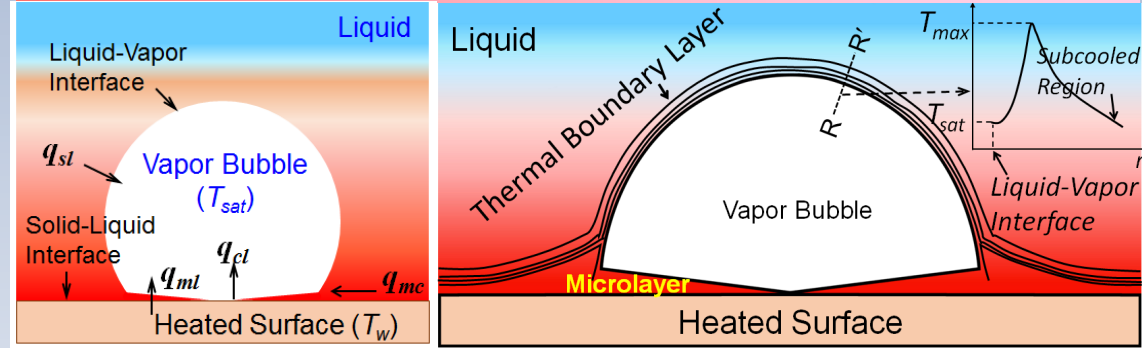
CO₂ Capture & Clean Ocean



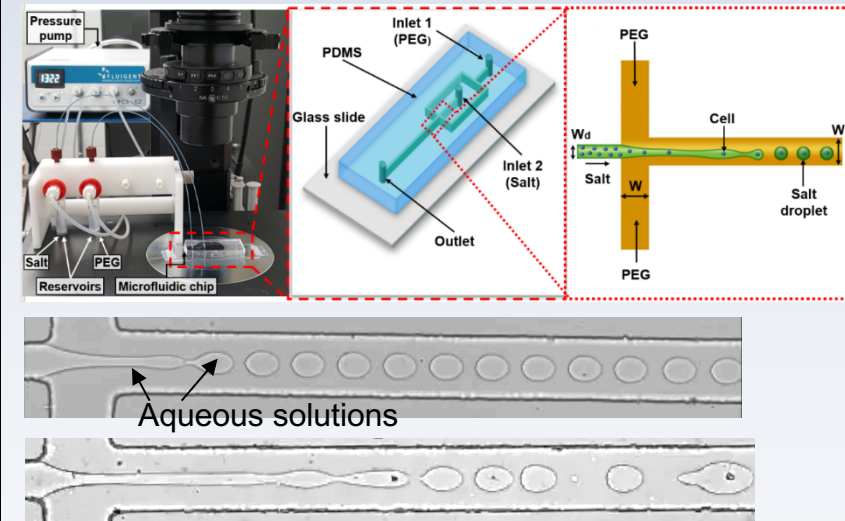
Microfluidic Photobioreactor



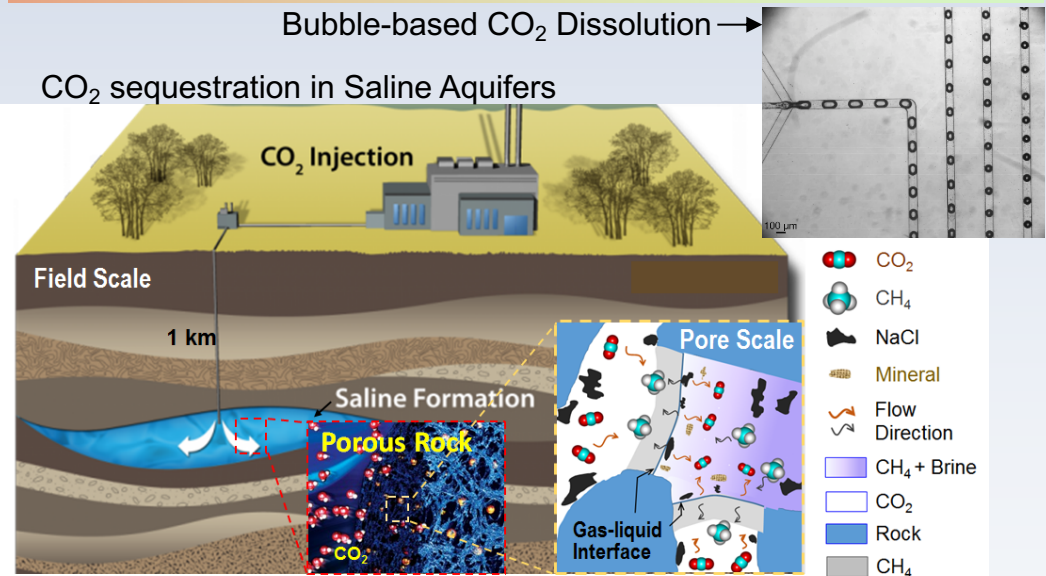
Nucleate Boiling – Bubble Growth Mechanisms



Cell Encapsulation in Microdroplets



Multiphase Interactions in Geologic Reservoirs





Dr. Hassan Mahfuz
Professor

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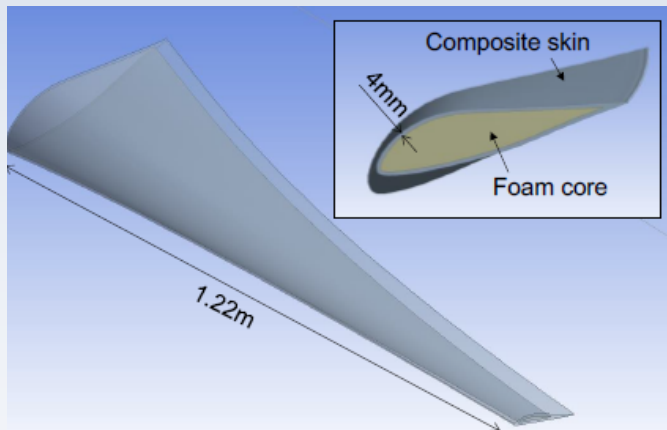
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Research Interests

- **Nanostructured Materials**
- **Wind and Ocean Turbines**
- **Offshore Structures**
- **Armor Materials and Ballistic Impact**

Ocean Current Turbine Blade



Spike Test of Flexible Armor



Current & Pending Research Projects

1. Hybridization of UHMWPE with nylon and nanotubes to develop high energy ballistic fibers – CTTSO (Combating Terrorism Technical Support Office)
2. Composite wet suit development with carbon nanotubes and silica microballoons reinforcement – NSWC (Naval Surface Warfare Center), Panama City Division

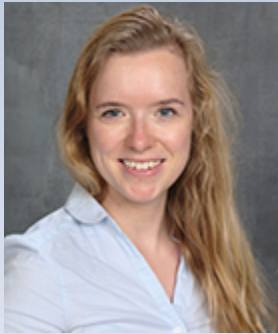


Dr. Oren Masory
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Dr. Aditya Nayak
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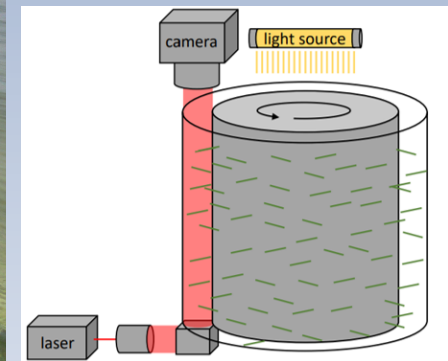
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Research Interests

- Oceanic optical instrumentation
- Oceanic particle/plankton studies
- Biophysical interactions
- Harmful algal blooms, ‘thin layers’



Current & Pending Research Projects

- Development of an autonomous digital holographic imaging system for 3-D particle and flow characterization in the ocean
- Automated classification of oceanic particles/plankton from holographic imagery
- Harmful algal bloom monitoring and detection
- Orientation and growth of phytoplankton in different flow regimes



Dr. Francisco Presuel-Moreno
Professor and Dir. Graduate
Programs

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Research Interests

- Durability of concrete structures
- Corrosion and corrosion prevention of reinforcing steel embedded in concrete
- Durability of composites and effects of interconnected metals
- Marine Materials and Corrosion

Figure 1



Recent, Current & Pending Research Projects

- Corrosion Propagation of Carbon Steel Rebars in High Performance Concrete
- Durability of Fiber Reinforced Concrete Pipe Exposed to Florida Aggressive Environments
- Metal – Carbon Fiber Composite Interconnects in Seawater
- Investigation into the Contributing Factors to the Corrosion of Steel Reinforced Concrete Structures at Elevations Greater than 12 Feet Above the Mean High Water Line



Dr. Gary Salivar
Assistant Dean for Support Services
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Dr. Joe Su
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AIM: Collaboratively, Addressing Humanity's Top Problems : Energy, Water, Food & Environment

Produce More Fish

Monitor New Arctic

Explore Ocean Beneath with AUV

Develop Subsea Morphing Structure

Learning from Old to Make Structure Resilient

Advancing Scouring Research

Make Airfoil/Hydrofoil Resilient/Efficient

**Open a New World: Nexus of Food, Energy ,
Water & Environment**



**Hybrid Aerial/Underwater
Robotic System (HAUCS) for
Scalable, Adaptable
Maintenance of Aquaculture
Fish Farms**

NSF/NIFA, \$1.2 M, 2019-2023

PI: Bing Ouyang, HBOI,

Co-PIs: Paul Wills, Jason Hallstrom,

Tsung-Chow Su

Tsung-Chow Su; su@fau.edu

Open a New World: Nexus of Food, Energy, Water & Environment

A proposal to develop an enclosed, self-sustainable food, energy and water (FEW) system on the Qinghai-Tibet Plateau by building food factories for the world on the Qinghai-Tibet Plateau, with an abundance of water, renewable clean energy and **intelligent farming** to support the growing population and to sequesterate carbon dioxide with **geoengineering**.



(a)



(c)



(b)



(d)



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