The Pancreatic CRCE went through reorganization at the beginning of the 2020 academic year.Our current research efforts are geared towards early-detection (Li, Hua) and treatment (Prakash, Hua, Wallace) of pancreatic cancer. Dr. Li and Hua have recently demonstrated a patent-pending approach for direct detection of proteases, a potential biomarker for early cancer detection and prognosis, in human serum with a physiology-compatible neutral buffer (J1, C1, P1). Dr. Hua is developing various natural products (J2) with anti-pancreatic cancer activity, and is working closely with Dr. Wallace to evaluate their efficacy in vitro. The Wallace lab received a $100,000 supplement (collaboration with P. Chung, Pittsburg State) to their P20 award from the NIGMS to expand those studies by testing the hypothesis that a p300 inhibitor (CCS1477) will increase the sensitivity of pancreatic cancer cells to a genotoxic therapy (cisplatin). Dr. Prakash's group has recently completed *in vitro* thermal dosimetry studies to assess cell survival and stress protein expression following exposure to mild hyperthermia (C2). Together with other members of the CRCE, Dr. Prakash is MPI of a recently submitted R01 proposal on a mild-hyperthermia approach for treatment of pancreatic cancer.

The 2020-21 academic year was especially challenging due to the ongoing COVID-19 pandemic curtailing collaborative research activities; we are optimistic the year ahead will allow for more sustained efforts.

Journal papers:

J1. Song, Yang; Wright, J.; Anderson, M.; Rajendran, S.; Ren, Z.; Hua, D.; Koehne, J. E.; Meyyappan, M.; Li, J., Quantitative Detection of Cathepsin B Activity in Neutral pH Buffers Using Gold Microelectrode Arrays: Toward Direct Multiplex Analyses of Extracellular Proteases in Human Serum. *ACS Sensors* **2021,** *online*. DOI:10.1021/acssensors.1c01175, **accessat:** https://pubs.acs.org/articlesonrequest/AOR-JK8DVMJGEYGHVFQTQDJC

J2. Synthesis and Characterization of Bimetallic Nanoclusters Stabilized by Chiral and Achiral Polyvinylpyrrolidinones. Catalytic C-H Bond Oxidation. Huafang Fan, Zongbo Tong, Zhaoyang Ren, Kanchan Mishra, Shunya Morita, Edruce Edouarzin, Lingaraju Gorla, Boris Averkiev, Victor Day, and Duy H. Hua. J. Org. Chem. **2021**, to be submitted in October 11 – 15, 2021.

Conference Presentations:

C1. Toward Rapid Profiling of Proteases Activities for Cancer Diagnosis Based on Multiplex Microelectrode Array Sensors, Yang Song, Morgan J. Anderson, Huafang Fan, Jestin Gage Wright, Zhaoyang Ren, Sabari Rajendran, Duy H. Hua, Jessica E. Koehne, M. Meyyappan, and **Jun Li**[*], 240th ECS Meeting, Oct. 10-14, Orlando, FL (switched to online). **Invited.**

C2. Chamani F, Pyle M, Shrestha T, Sebek J, Barnett I, Bossmann SH, Sheth RA, Prakash P. In vitro measurements and mathematical modeling of hyperthermia induced injury in pancreatic cancer cell lines. Submitted to the 2022 Annual Meeting of the Society for Interventional Oncology.

Provisional Patent Application:

P1. Multiplex Microelectrode Array for Detection of Proteases as Biomarkers, Jun Li, Duy Hua, Yang Song, Huafang Fan, Morgan Anderson, Jessica Koehne, Meyya

Meyyappan, **Provisional Patent Application No.: 63/179,848**, Filed on Apr. 26, 2021, Applicants: Kansas State University Research Foundation and NASA