Research Areas

Electronic, Magnetic & Photonic Materials
Energy
Materials Processing
Nanomaterials & Nanotechnology

Research Interests

We are concerned with describing the fundamental optical and electronic properties of organic and hybrid organic-inorganic semiconductor systems. We ultimately seek to exploit the unique properties of these materials to create novel electronic and optoelectronic devices. This interdisciplinary work involves elements of physics, chemistry, materials science and electrical engineering. Of particular focus is the improvement of organic and perovskite solar cells, organic light-emitting devices, and organic lasers.

Awards

Leverhulme Trust Visiting Professor, Cavendish Laboratory, University of Cambridge
Visiting Fellow, Clare Hall, University of Cambridge
Horace T. Morse – UMN Alumni Association Award for Outstanding Contributions to Undergraduate Education
ASM Bradley Stoughton Award for Young Teachers
College of Science and Engineering Outstanding Teacher Award
Institute on Renewable Energy and the Environment (IREE) Young Faculty Award
3M Nontenured Faculty Award

Selected Publications

Carrier-gas assisted vapor deposition for highly tunable morphology of halide perovskite thin films, C.P. Clark, B. Voigt, E.S. Aydil, R.J. Holmes, Sustainable Energy and Fuels, Advance Article (2019)


Lead-free double perovskites Cs 2 InCuCl 6 and (CH 3 NH 3 ) 2 InCuCl 6: electronic, optical, and electrical properties, H.Q Pham, RJ Holmes, E.S. Aydil, L. Gaglardi, Nanoscale, 11, 11173, (2019)