

# Theresa Christian



**Graduate Institution:** University of Colorado - Boulder

**Graduate Discipline:** Physics

**Hometown:** Boulder, CO

**Relevant SC Research:** Basic Energy Sciences

## Research Interest:

I am interested in the electronic and optical properties of semiconductor materials. In particular, my current research focus is on understanding the phenomena that govern efficient radiative recombination of carriers in a solar cell or light generation in an LED. In order to design materials with appropriate bandgap energies within the visible spectrum, we study crystalline alloys with carefully controlled compositions featuring three or four different species of atoms. The bandstructure properties and carrier lifetimes of the resulting alloys are strongly related to the atomic arrangement that forms during growth, including various types of crystal defects as well as order or disorder of the constituent species.

Through spectroscopic studies of different alloy samples, we are able to explore the specific mechanisms that contribute to each material's structure and, in turn, its excitation spectrum and carrier dynamics.

## About Me:

I completed my undergraduate degree at MIT in 2008. I then spent one year living and studying abroad at the Ecole Polytechnique Federale in Lausanne, Switzerland (EPFL) followed by several months wrangling spin qubits at low temperatures in a research lab at Harvard to round out my master's degree in Physics. Before returning to academics, I also spent one year in Cambridge, MA at the Fraunhofer Center for Sustainable Energy Systems where my job description

included making and destroying dozens of silicon-based photovoltaic modules to better understand their loss mechanisms and failure modes and the design requirements for best overall energy conversion.

Currently I live and study in Boulder, CO while carrying out research at the National Renewable Energy Lab (NREL). I am personally interested in many energy-related technologies and sustainability strategies, and I enjoy my exposure to the broad research base surrounding me at NREL. Outside of science, I take advantage of the Colorado landscape in the classic local style by hiking, biking, skiing, and rock climbing.



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