Stacking Up Solar: Designing new semiconductors for multijunction photovoltaics

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If someone told you that we need to double the amount of power produced on our planet within 30 years, how would you do it? If you're like the Belisle lab at Wellesley College you would seek novel renewable energy solutions that maximize efficiency, minimize cost, and can be manufactured extremely quickly. In our research we are supporting the development of perovskite solar cells: designed for record-breaking efficiency through tandem (stacked) devices. In this talk we'll discuss the fundamental physical limits to many modern solar cell technologies, and how we can use tandem device architectures to surpass these limits. I'll describe the unique benefits and challenges to working with this very exciting and new class of optoelectronic materials – mixed-halide perovskite semiconductors. By documenting the fundamental properties of existing perovskite semiconductors (like their structural stability and their optoelectronic properties) and synthesizing new perovskite compositions we are identifying performance limits and areas for opportunity for the next generation of solar energy materials.

Bio: Rebecca Belisle is an assistant professor of physics at Wellesley College where her research group focuses on synthesizing and characterizing new solution processed semiconductors. Trained as a materials scientist (PhD from Stanford University, MPhil from the University of Bath, and BS from Olin College), Dr. Belisle loves exploring how we can use an understanding of chemistry and structure to design materials to solve real world problems. Currently her lab is focused on the need for new renewable energy technologies and is using *in situ* characterization of atomic structure and optical properties to develop wide bandgap perovskite semiconductors for tandem solar cells. Outside of the lab Dr. Belisle is a distinguished teacher with a passion for undergraduate education, having developed student-centered and active curriculum in the areas of mechanics, thermodynamics, and materials science.