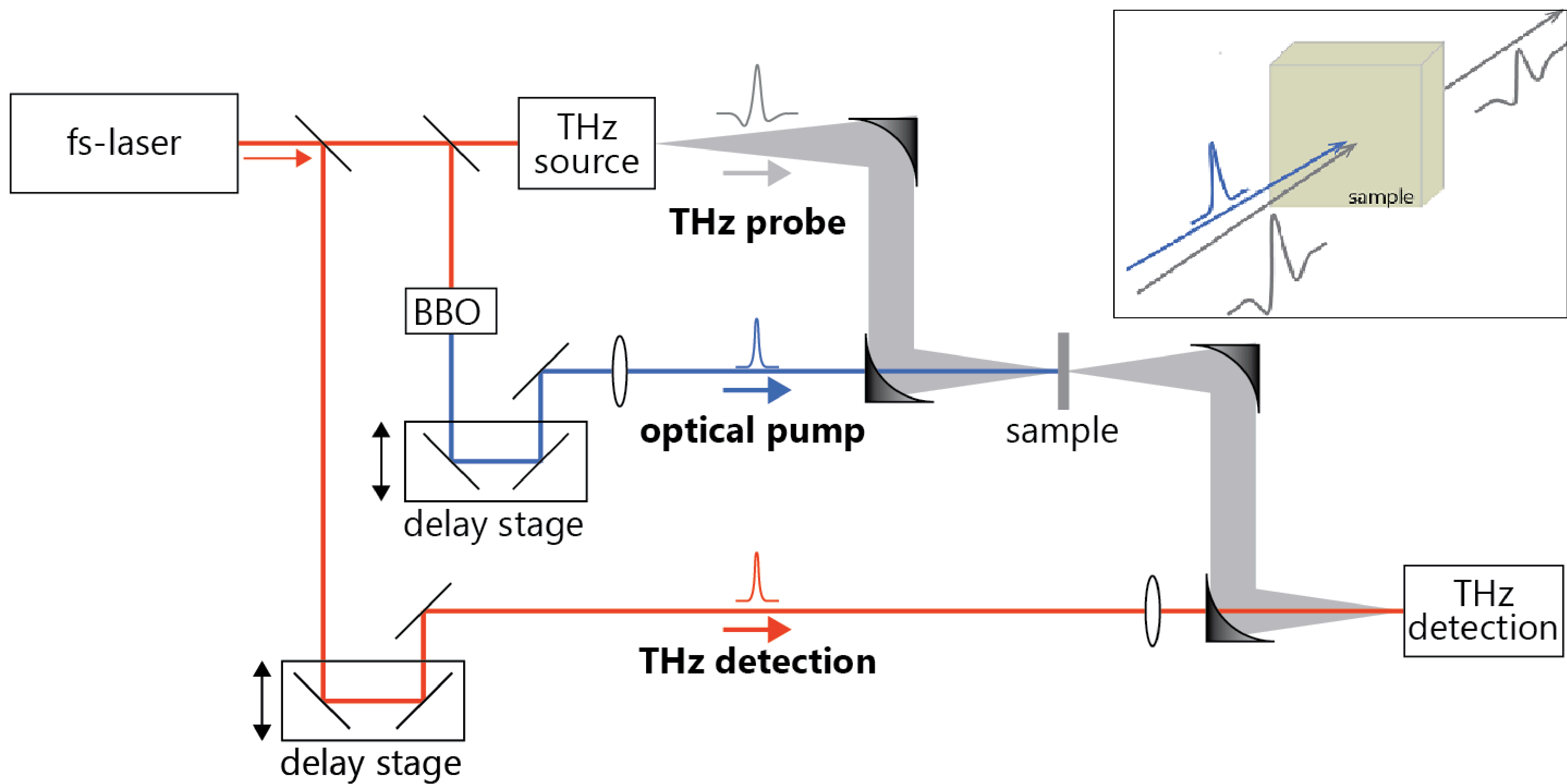


Ultrafast Spectroscopy Lab

Dr. Meng-ju Renee Sher’s research group conducts experiments that primarily investigate the potential of semiconductor materials for renewable energy applications. To do so, they use an ultrafast laser that sends terahertz (THz) pulses at a given material to investigate what actually happens to a solar cell the moment that sunlight strikes it. In general, the laboratory studies new and emerging materials that may be promising for future solar cell development. They analyze the defects in semiconductor materials and see if they can engineer the material's performance. With intentionally incorporated defects in a material, their properties can change dramatically—for example, defects in a material could alter the excited charge carrier's lifetime and mobility.

Dr. Sher’s research group also works on developing and improving THz characterization techniques, in order to design ideal setups for material analysis.



The research group is currently focusing on three projects, two of which specifically involve the study of new materials and one project to improve existing tools and data analysis. They analyze the efficacy of metal halide perovskite solar cells—a material that has a high potential to create cheap and efficient solar cells. They also study the potential of hyperdoping, a process in which dopants are implanted into silicon or germanium in order to improve their optical and optoelectronic properties.

Finally, they are looking to expand the window of time that they are able to study/collect data by upgrading their experimental setup. This will enable them to study material samples with longer excited state lifetimes and study the long-term development of currently studied materials.

