Abstract
Bacterial cellulose is being considered as a key feedstock for biofuel production and for the production of sustainable nanomaterials. The overall goal of my research is to engineer cellulose-producing bacterium *Gluconacetobacter xylinus* to control the molecular structure of cellulose. By modulating levels of key proteins involved in cellulose biosynthesis using a methodology applicable to plant systems, the formation of amorphous cellulose may be controlled, enabling efficient conversion of cellulose to both biofuels and nanomaterials. My preliminary results with exposing *G. xylinus* to the antibiotic ampicillin show that bacteria stressed by sub-lethal antibiotic concentrations produce cellulose with altered structural and crystalline properties. Additionally, many genes have been shown to govern cellulose biosynthesis, but their effects on bacterial cellulose crystallinity have not been fully explored. My research will also explore how two genes with high sequence similarity to Bacterial Cellulose Synthesis Gene AB (*bcsAB*) influence cellulose crystallinity and structure. I am requesting support to carry out two related experiments—crystallinity influenced by antibiotics and crystallinity influenced by two *bcsAB*-related genes—and to publish my work.