Budget Justification
The total amount of support requested from NSF is $483,089 over three years. The money requested from NSF will be used for the following expenses:

**Personnel: $190,383 over 3 years**
This charge includes a 5% academic year (AY) charge and 2 weeks of summer salary per year for Dr. Nomura to work on the assigned project with fringe benefit costs starting at 50.16% and increasing to 56.52% for the AY and 17% for the summer appointment. There will be two graduate students as outlined in the proposal (Ms. Lucia Salamanca-Cardona and Ms. Xian Wang) supported throughout the duration of this project. The costs of the graduate students include an indirect fringe cost starting at 14.5% in year 1 and increasing to 18.5% in year 3.

**Tuition: $67,195 over 3 years**
Funds are requested to cover the tuition of the graduate students for 3 years. The costs per student are $10,763 in year 1, $11,193 in year 2, and $11,641 in year 3.

**Travel: $3,000 over 3 years**
Travel money is requested to cover expenses of scientists and students to attend, participate, and present results from this study at local and national meetings. These costs will cover meeting registration, room and board, and transportation expenses.

**Stipend for CSTEP or LSAMP summer undergraduate student: $15,000 over 3 years**
Funding is requested to support a summer stipend for a CSTEP or LSAMP student from SUNY OCC to participate in the project as outlined in the Broader Impacts section of the proposal. This stipend will cover living expenses for an undergraduate student during each summer of the proposed work.

**Administrative fees for SUNY OCC CSTEP and LSAMP participation: $3,600 over 3 years**
Funding is requested to help defray administrative charges for managing and recruiting students for the CSTEP and LSAMP program. This will be done in collaboration with Drake Harrison at SUNY OCC in order to administrate recruiting goals as outlined in the Broader Impacts section of the proposal.

**Materials and supplies: $60,000 over 3 years**
Consumables, chemicals, and general lab supplies will be purchased from this budget. This charge includes supplies for general lab supplies and disposables such as custom DNA sequences for PCR reactions to manipulate DNA expression vectors for the expression of enzymes in recombinant *E. coli*, Gibson assembly kits from NEB, and custom gene synthesis. Additionally, reagents for genetic engineering and molecular biology, such as restriction enzymes, Qiagen RNA purification kits, Invitrogen plasmids, PrimeStar polymerase, *Pfu* polymerase, ligase, agarose, etc. will be required for this project. Miscellaneous lab supplies including gloves, lab coats, safety glasses, flasks, pipet tips, Petri dishes, filters, etc. will be purchased with these funds as well. Costs for DNA sequencing and analytical services from SUNY-ESF will also be paid through this funding.

**Indirect costs: $143,911 over 3 years**
SUNY-ESF will charge their federally negotiated rate of 56.0% of modified total direct costs.