Bingbing Li's group Research projects: Summer 2017
Program will start: June 5, 2017 till August 11, 2017 (20 hours per week, minimum three days/week)

For more information please call (818) 677-6229, or visit Prof. Li in JD-3305 during weekday M-F.

1. **Research Title: Customized Orthodontic Brackets Created by Selective Laser Melting Process for Orthodontic Treatment**

Research Objectives:
The additive manufacturing industry has been of interest in the past decade, especially within the orthodontic industry with new manufacturing methods to produce orthodontic implants. The ability to manufacture orthodontic brackets in situ and on demand is substantially beneficial to minimize production costs, produce less waste material, and eventually provide faster patient treatment. For these reasons, the fabrication of near net shape orthodontic implants printed via selective laser melting (SLM) technology will allow researchers to find new methods of developing 3D printed orthodontic implants. The Renishaw AM400 with the resolution of 20 microns demonstrates the possibility of using SLM technology to fabricate a bracket implant with features under 3 mm in size. By using metallographic observation, surface coatings and surface finish processes, it is capable to produce mechanical properties and surface finish specifications that adhere or surpass to current orthodontic standards.

2. **Research Title: 3D Bioprinting of Aneurysm Blood Vessel**

Research Objectives:
Three-dimensional (3D) bioprinting has opened the door to new methods of printing, especially the methods used for tissue engineering and the production of artificial organs and tissues. Having the capability to 3D print functional artificial tissues on demand is extremely beneficial for studying all aspects of these tissues and organs and ultimately eliminating the need for donors. Cardiovascular disease is the leading cause of death in the United States, at a staggering 25% of fatalities for both men and women. Estimated annual incidence rates of Aneurysm, an excessive localized enlargement of an artery, range from 10 to 15 cases per 100,000, which translates to at least 30,000 annual cases in the United States.

A better understanding of the flow parameters that causes rupture is crucial. Therefore, the production of an aneurysm blood vessel model can allow researchers to find new methods of testing and analyzing this naturally occurring abnormality. The Aneurysm model is a complex structure due to the bulge created on the artery. This work explores the micro-extrusion method for bioprinting Aneurysm models. This method is inexpensive, can be used to print desired shapes, and has flexibility in the selection of the 3D printer. The use of a hydrogel as support bath allows this method to be implemented with other hydrogels that are printed within the hydrogel support bath which maintains the intended structure while printing.