Integrating nanoplasmonic-based heating with digital droplet PCR for rapid and highly sensitive diagnostics

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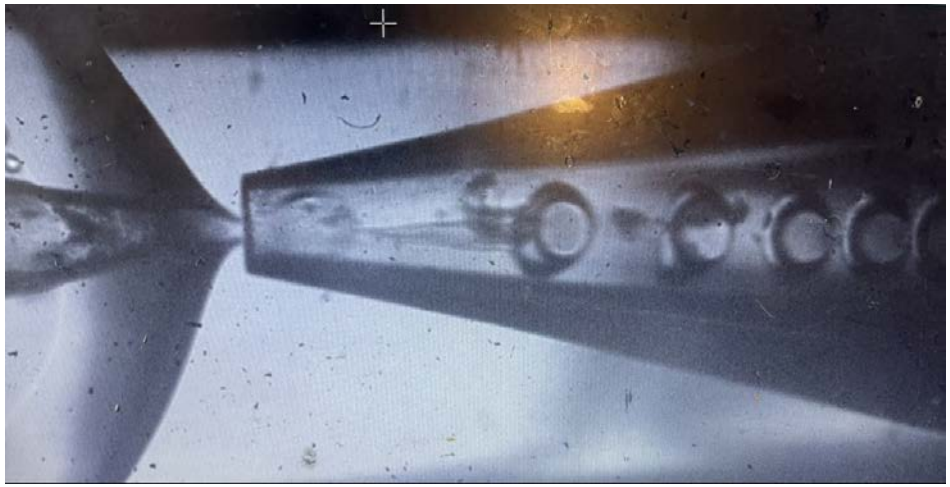
Digital droplet polymerase chain reaction (ddPCR) is a method that amplifies DNA and therefor; provides high sensitivity for clinical diagnostics. However, in order to expedite ddPCR we must integrate it with nanoplasmonic-based heating which is needed for ultrafast PCR thermocycling. To achieve this, microfluidics is an important technology that allows us to encapsulate the DNA in a water-oil based solution for achievable study. This study used glass-capillary microfluidic devices to create stable double emulsions that will provide protection and successfully hold the PCR . We learned that the entire glass- capillary fabrication process is very important as well as the viscosity. Overall, we learned that this system provides the basis for successfully integrating nanoplasmonic-based heating with digital droplet PCR for rapid and highly sensitive diagnostics.



The photo above shows double emulsions created by a glass-capillary device.

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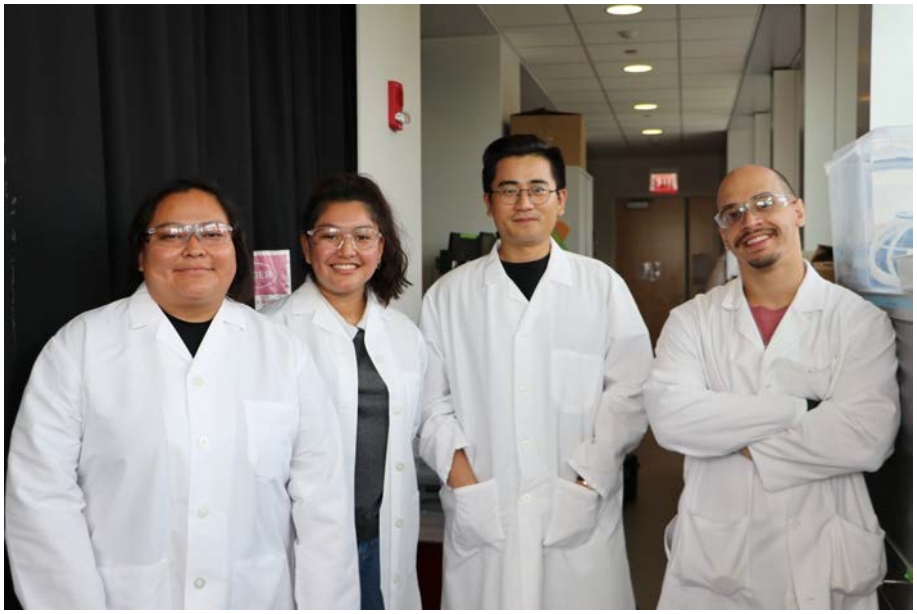
My name is Layla James. I am second-year undergraduate at Navajo Technical University. I am a biology major. My experience at Harvard has expanded my mind on my research interests. I enjoy research in the biomedical engineering field as well as the molecular and biomedical science field. I want to attend graduate school to earn a PhD. I would like to someday create a new line of Native American plant-based therapeutics.



The image above shows the following research group from left to right;
Lab partner Katelyn Wilson, Layla James, Mentor Yang Wang and Mentor Jean- Carlos Serrano.