



CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s) Sakina Bambot	Project Number S0604
Project Title Study of the Degradation Mechanism of Contact Lenses: Investigation Using TOF-SIMS	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment was to study the degradation mechanism of 30-day contact lenses by using the TOF-SIMS technique. The goal was to understand why contact lenses got uncomfortable towards the end of the thirty days.</p> <p>Methods/Materials The contact lenses were rinsed with distilled water and the ring finger was gently run across the lens# surface 7x, 14x, 21x, and 28x while fifth lens was kept untouched. Each rub simulated one day of wear. Each lens was inserted into the TOF-SIMS instrument. The data was collected from the center of the lens using a square region of 150 microns x 150 microns. Next, using an Argon cluster gun setting a square crater of 500 microns x 500 microns was etched onto the surface and a spectrum from the surface created a depth profile that was collected until the signal from the material of the silicone lens had become stable. Nitrogen containing fragments were indicative of the hydrophilic coating (mass 112 C(6)H(10)NO) and a silicon-containing fragment indicated the core material of the lens (at mass 73 C(3)H(9)Si).</p> <p>Results The point at which the mass 112 (C(6)H(10)NO) and mass 73 (C(3)H(9)Si) fragment ions intersected was used as an indicator of the coating being depleted. The time at which the two fragment ions intersected became shorter when going from 0 to 7x to 14x to 21x and then to 28x indicating that the hydrophilic coating on the contact lens was becoming thinner with wear.</p> <p>Conclusions/Discussion The new lens had a much thicker hydrophilic coating than compared the coating of 28x lens, showing that the 30-day wear contact lens coating is not immune to degradation and is delicate. This research helps understand the wearing down of long-term contact lenses.</p>	
Summary Statement Using the TOF-SIMS technique, I simulated wearing a 30-day contact lens throughout the month and found that the coating of the lens became thinner with wear.	
Help Received I used the TOF-SIMS instrument at Evans Analytical Group under the supervision of Dr. Ginwalla who taught me how to use it.	