



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Erik J. Aidukas</b>	<b>Project Number</b> <b>S0501</b>
<b>Project Title</b> <b>The Effects of Wetting Agents on the Thermosensitive Capillary Action of Poly(N-isopropylacrylamide) Coated Glass Tubes</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The project addressed the effects of various wetting agents on the capillary action of poly(N-isopropylacrylamide) coated glass tubes. Poly(NIPAAm) is the most commonly used biocompatible thermosensitive polymer. Wetting agents tested were representative of most wetting agents in their respective categories.</p> <p><b>Methods/Materials</b> After cleaning, capillary tubes (100um (ID)) were filled with toluene solution of 10% Bind-silane and left to soak. The tubes were then rinsed with ethanol and water. An aqueous mixture of NIPAAm, methylene-bis-acrylamide, and TEMED in one syringe and ammonium persulfate (APS) in a second, were pumped into each capillary. Polymerization time was short and at room temperature. Wetting agents tested were 20% m/v ethylene glycol, 10% m/v tetraethylammonium chloride, and 5% m/v sodium dodecyl sulfate. The solutions were placed on a hotplate/stirrer. Temperature and column height was collected through a CBL system.</p> <p><b>Conclusions/Discussion</b> The data collected did not support any findings after analysis. The thermosensitivity of the control group was fit into an inverse sigmoidal curve but the standard deviation was so large that the column height change was statistically insignificant. Three of the constants used to model the data had no theoretical basis. This suggests that the system cannot be represented as a simple two-state system dictated by an equilibrium constant. More accurate results could be collected by using an individual capillary tube multiple times at a narrower range of temperatures, avoiding temperature shock or denaturing of the polymer. A further study may consider thermosetting the solutions and tubes at set increments in an incubator before measuring capillary height, which would allow for more accurate analysis of the end states. Also, contact angle measurements could be made by photographing the meniscus and drawing a tangent line at each temperature interval. All suggestions for future study made on this application are planned to be carried out after the filing date.</p>	
<b>Summary Statement</b> The project addresses the effects of wetting agents on the thermosensitive capillary action of poly(NIPAAm) modified tubes.	
<b>Help Received</b> Lab equipment at CSUCI was used under the supervision of Dr. Philip Hampton.	