Hello!
We are the Roboteers!

We come from Morgantown, W.V.  
We are sponsored by WVU Physics.  
Here is our mascot;
Color Changing Hair

We are going to make a hair dye that you can spray on that will change color according to your mood and temperature of your head; similar to how a mood ring works. Our product is called “MoodHair”. We will use nano-sized thermotropic crystals.

We think that there is a market for color changing cosmetics. Specifically color changing hair and makeup according to the consumer.

Mood rings (earrings, necklaces, etc.) are quite popular these days. They change color according to the temperature of your finger. Mood rings contain thermotropic liquid crystals that change position or twist when the temperature changes. This shape change causes the crystals to change color.

The Barbie® Company already makes dolls with color changing hair; the dolls hair changes when you put it in hot water or cold water.

Our Research questions are: How do mood rings work? Why use nanotechnology?

Our challenge: Hair spray that changes color according to your mood and does not weigh down your hair. And can nanotechnology produce color changing product?

Why use nanotechnology? When you spray the hair dye on the hair wouldn’t weigh it down, and optical properties change when structures get small (about 10 nanometers.)

Nanotechnology already helps with color changes in many ways, here are some examples:

- Camouflage clothes - Some companies are trying to make camouflage clothes that change color and texture according to its background. This is to help our troops blend in when on the move.

- Zinc Oxide - Making things small helps change their color. For example lotion and sunscreen is made out of Zinc Oxide (ZnO). Zinc Oxide is now clear but when it was first used as a sunscreen it was white. This is because back then Zinc Oxide was bigger so it looked white. Now we grind it up really, really small (less than 1000 nm) so it’s now clear.

- Gold - Gold is normally yellow. If it is ground up really fine, it will appear reddish. That is how we get red stained glass.
Zinc Oxide

mood hair
Length Changing Clothes

Wouldn’t it be nice if your clothes could change length in the hottest day in summer, or the coldest day in winter? How about when your children are too tall for their clothes, you can just change the length instead of buying a new pair.

We learned that some companies are making carbon nanotubes stretch. They can stretch by electrical fields or by temperature. We hope to change the length of clothing by temperature.

Since the 1990’s new electroactive polymer (EPA) materials have emerged that exhibit large strains such as stretching, contracting, or bending. EPA material development has been reported in the last 15 years where materials that can create liner strains that can reach up to 380% have been developed.

“Mats of nanotubes assembled into electrodes will expand and contract as electrodes in an electrochemical cell.” says Olle Inganas and Ingemar Lundstrum.
References

**Color Changing**
3. Dr. Thomas H. Myers
4. [http://home.howstuffworks.com/question 443.htm](http://home.howstuffworks.com/question 443.htm)

**Length Changing**
Nanoscience Field Trip

The Roboteers went to Dr. Myers lab to learn about nanotechnology. Dr. Myers is the co-director of West Virginia Nano (WVNano) and a nanotechnology leader in West Virginia. His group is mainly focused on semiconductor devices. Dr. Myers and the physics department have many million dollars of nanotechnology equipment in their lab.