EXPLORATION ACTIVITY:

"UNRAVELING" THE SCIENCE…

THE UNIVERSITY OF TOLEDO

S.C.O.P.E. OUTREACH PROGRAM

OBJECTIVE: In this exploration lab, students will investigate the structure of different types of fabrics in order to understand how a materials structure can determine its use.

ACTIVITY DESCRIPTION: Using the cyber-enabled scanning electron microscope (SEM), students will look at various fibrous materials. They will investigate and obtain micrographs (images) of wool, silk, cotton, leather, and several other cloth fabrics.

MATERIALS:

Scanning Electron Microscope (cyber-enabled)
SEM specimen mount
Carbon Tape or carbon paste
Scissors
Fibers of Silk
Fibers of Wool
Fibers of Leather
Fibers of Cotton
Fibers of UnderArmor ©
Fibers of Waterproof Track gear
Fibers of Eyeglass cleaning cloth
Tweezers
Latex/Nitrile gloves
Optional: Sputtering apparatus (gold or carbon coating)

PROCEDURE:

1. Put on gloves
2. Cut several small pieces of double-sided carbon tape and place on specimen mount.
3. Place a number next to each piece of tape to indicate the "specimen number".
4. Use tweezers/forceps to place a small amount of each specimen onto one of the pieces of carbon.
5. Once the specimen are securely mounted, *invert the specimen mount* to ensure that the materials will remain mounted upon introduction to vacuum.
6. *Optional:* Place mount containing specimen in the sputtering apparatus and coat with a layer of conductive material (either Au or C).
7. Once the specimen is ready for imaging, transfer it into the SEM and proceed.
8. Use an acceleration voltage of 5kV to image the samples, and only increase if ideal resolution is not obtained.
9. Find a "specimen number" to indicate what is being viewed, image the specimen and make observations about the material. Try to identify unique characteristics of each material such as fiber thickness, texture, binding, etc. Take a photo!
10. Repeat **step 9** for all other samples as well. Record your observations.
11. Finally, compare all micrographs (photos) and observations to determine which specimen number corresponds best to the known materials.