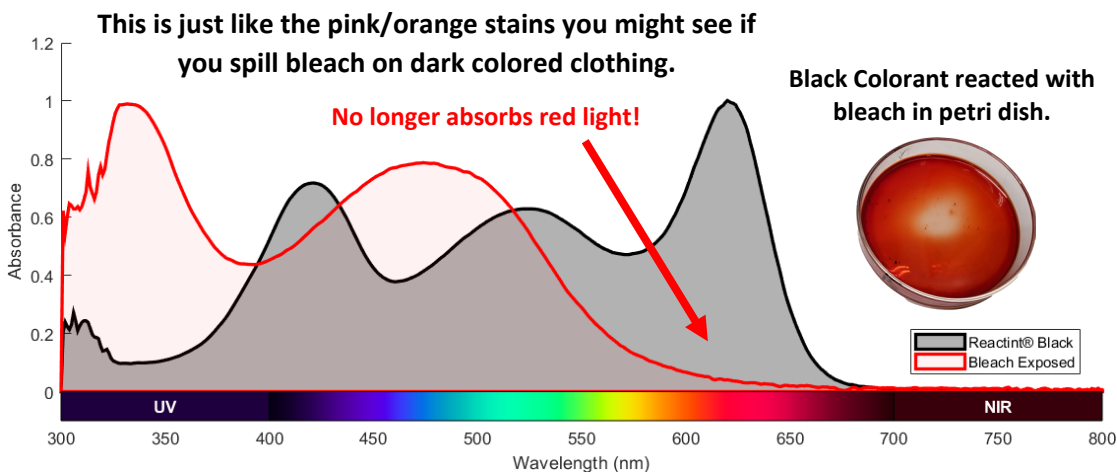


Case #1 Polyurethane Turns Pink After Bleach Exposure

- Material: Thermoset Polyetherurethane (Custom Formulation) 50A Durometer
- Colorant Used: Milliken™ Reactint® Black + TiO₂ white pigment
- Pink coloration is observed after exposure to 0.5% Sodium Hypochlorite (bleach)

The UV-Visible light spectrometer shows that the black colorant has a trimodal (3 peaks) spectrum with high absorbance across the full range of visible light (400 - 700nm). The chromophores (light absorbing molecular structures) in the colorant dyes are oxidized by bleach, changing their absorption profiles and resulting in red light no longer being absorbed! The color stability was improved by switching to a carbon black pigment.

Pink Polyurethane After Bleach Exposure



UV-Vis Spectrometer

Case #2 Diesel Fuel Test Kit turns Pink in the Presence of Water

Test kit contains a white powder dispersed in oil. Manufacturer claims that the powder will turn pink if mixed with diesel containing entrained (dissolved) water in concentrations exceeding 500ppm (0.05%). Composition Listed in the Material Safety Data Sheet (MSDS):

Chemical	CAS#	Expected Role
Soybean Oil	8001-22-7	Carrier solution miscible with diesel
Polyethylene Glycol	25322-68-3	Surfactant, aids in collecting entrained water
Polypropylene Glycol	25322-69-4	Surfactant, aids in collecting entrained water
Calcium oxide	1305-78-8	Reacts with water to create a basic solution.
Silicon Dioxide	7631-86-9	Prevents the calcium oxide from clumping.
Phenolphthalein	77-09-8	Turns pink in basic solutions

This is the same color change mechanism used in spackle that goes on pink and dries white.

Breast Cancer
Awareness Month
October 2023

Case #3 Silane Solution Turns Pink After Contact with Tungsten Carbide

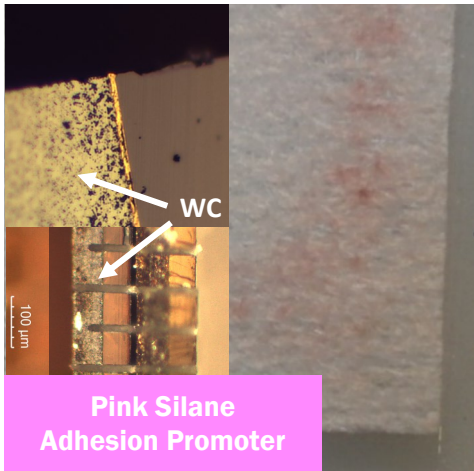
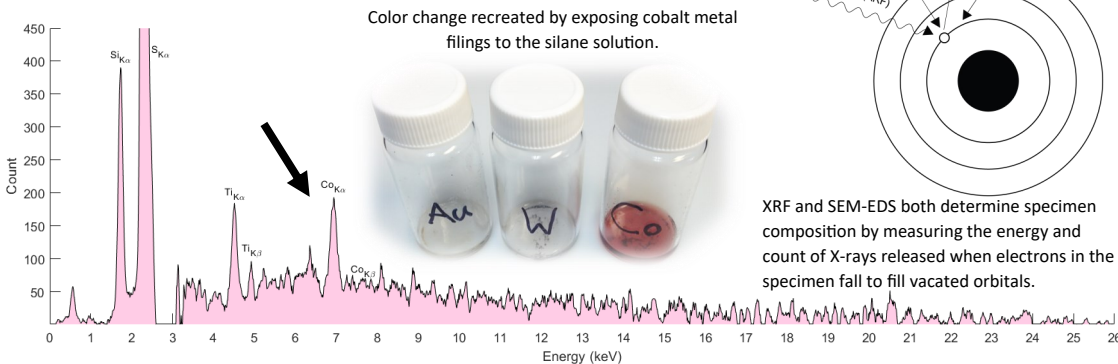
Analyst was executing an ultrasound transducer stack assembly procedure based on United States Patent: US7053521B2 (2006). The analyst noticed that the excess solution on his cleanroom wipes consistently developed a pink color a few minutes after contact with the tungsten carbide substrate.

The pink region on the wipe was analyzed by X-Ray Fluorescence Spectroscopy (XRF). XRF showed silicon and sulfur (from the mercapto silane), titanium (present in the cleanroom wipe), and **cobalt!**

Tungsten carbide is made from grains of tungsten carbide cemented together with cobalt. The cobalt metal can react with the silane solution to produce pink colored cobalt complexes.

Materials Involved:

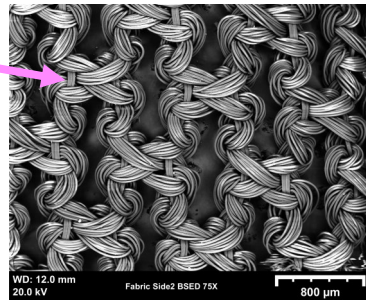
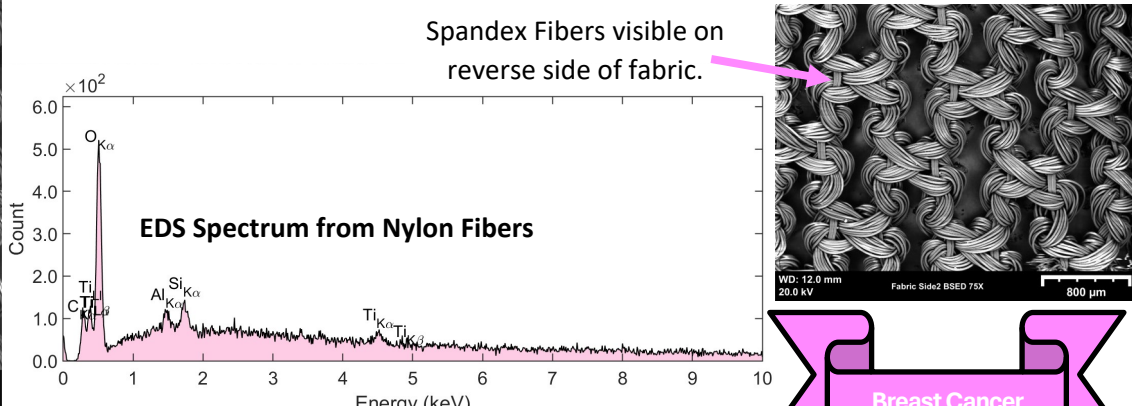
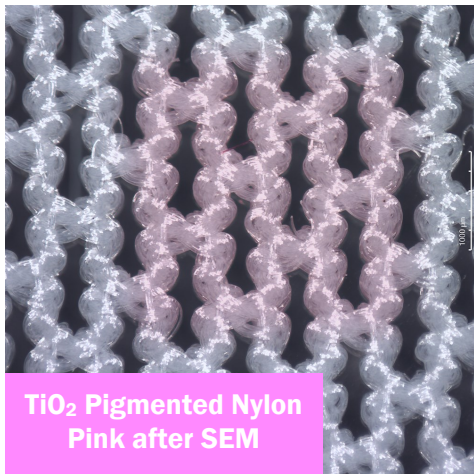
- Cemented Tungsten Carbide (WC)
- Sputtered Gold (Au)
- Isopropyl alcohol (IPA)
- 3-mercaptopropyl trimethoxysilane (MPTMS)
- 0.2 N Potassium Hydroxide (KOH)



Case #4 Nylon Turns Pink After Electron Beam Exposure

A fabric composed primarily of TiO₂ pigmented Nylon was analyzed by scanning electron microscope (SEM). The sample was removed from the SEM after ~2 hours of rastering over the same ~3x3mm region in various imaging modes. The scanned region had developed a faint pink color. The pink color faded, returning to the normal white color within 6 hours.

The only investigation done on this case was verifying that the color change was reproducible. The mechanism of the color change remains unsolved. Color changes in TiO₂ due to oxygen vacancies created after e-beam exposure are a known phenomenon. There are also two common thermoplastic pinking phenomena, one related to oxidation of hindered phenol antioxidants, and another related to TiO₂ and lead additives in polyvinyl chloride. Isolating the variables, potential mechanisms, and attempting to recreate the color change could be an effective means of investigation.



"Strawberry Milkshake" appearance of ATF in radiator coolant



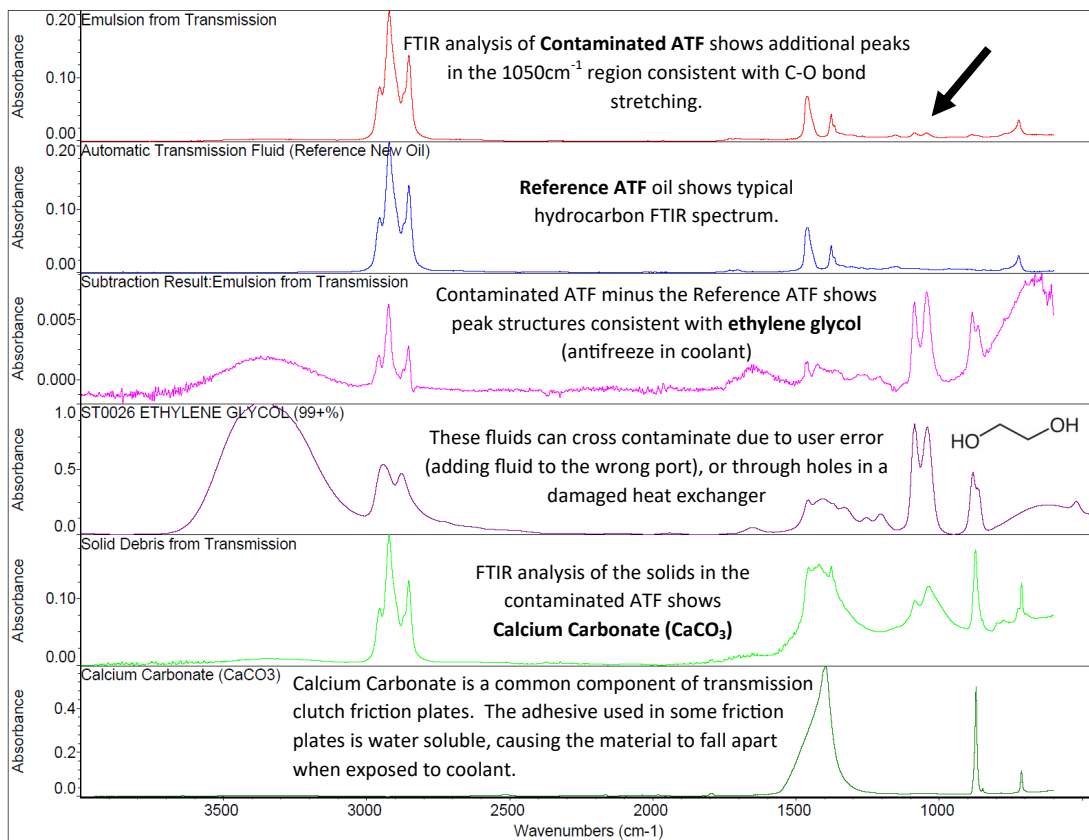
ATF in Coolant



Coolant in ATF

Case #5 Contamination of Automated Transmission Fluid (ATF)

A contaminated ATF sample with Karl Fischer Titration results showing ~1% water content was analyzed by infrared spectroscopy (FTIR). FTIR revealed glycol (antifreeze from coolant) and calcite (likely from dissolved clutch friction plates).



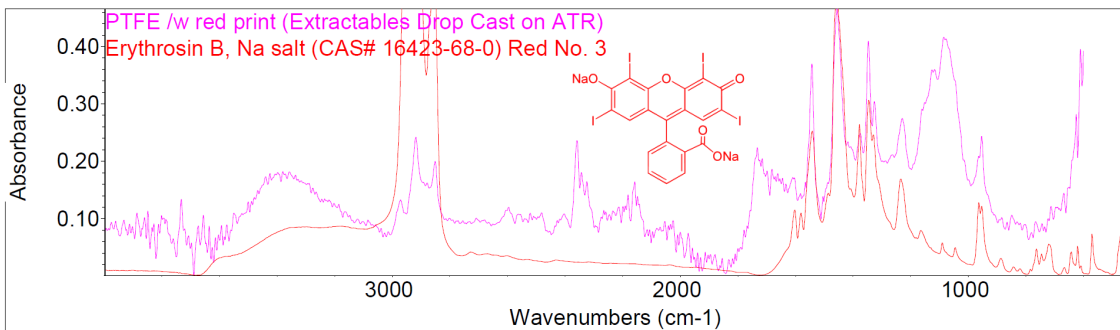
Case #6 Extractables & Leachables Analysis - Red #3 Dye

Teflon materials were evaluated for use in a medical device manufacturing process. Extractables and Leachables analyses were performed by infrared spectroscopy (FTIR) and gas chromatography mass spectroscopy (GCMS). The FTIR results showed Red No. 3 dye, coming from the contactless inkjet product markings on the Teflon.

Red No. 3 (erythrosine) dyes have been banned in cosmetic products since the 1990's due to cancer concerns. This dye has recently made the news cycles due to California passing a law banning its use in foods. This dye is present in many foods including: Marshmallow Peeps, red fruit snacks, strawberry shakes.



Red Labelling Ink



INGREDIENTS: SUGAR, CORN SYRUP, GELATIN, CONTAINS LESS THAN 0.5% OF THE FOLLOWING: POTASSIUM SORBATE (A PRESERVATIVE), NATURAL FLAVORS, RED #3, CARNAUBA WAX.
ALLERGEN INFORMATION: MAY CONTAIN MILK **GLUTEN FREE**

