

V-UV spectroscopy has been used to audition monomers for use as 157 nm materials. Since most components of air (i.e., CO₂, O₂) absorb strongly at such a short wavelength, it was necessary to do absorbance experiments *in vacuo*. Various series of compounds were examined using our group's Acton CAMS-507 spectrophotometer fitted with a custom-made, CaF₂-windowed gas cell attachment. The details of the cell design and implementation have been described previously.¹

Recent V-UV experiments aimed to examine the transparency of several current 157 nm materials, their functional groups, and some new sulfur-containing compounds we are investigating.

Selective fluorination at the 2 and 7 positions of norbornane has been shown to significantly lower their absorbance at 157 nm, as shown below. (Figure 1) In particular, fluorination at the 2 position leads to increased transparency over fluorination at the 7 position. Further, geminal fluorination yields the highest transparency for the norbornanes.

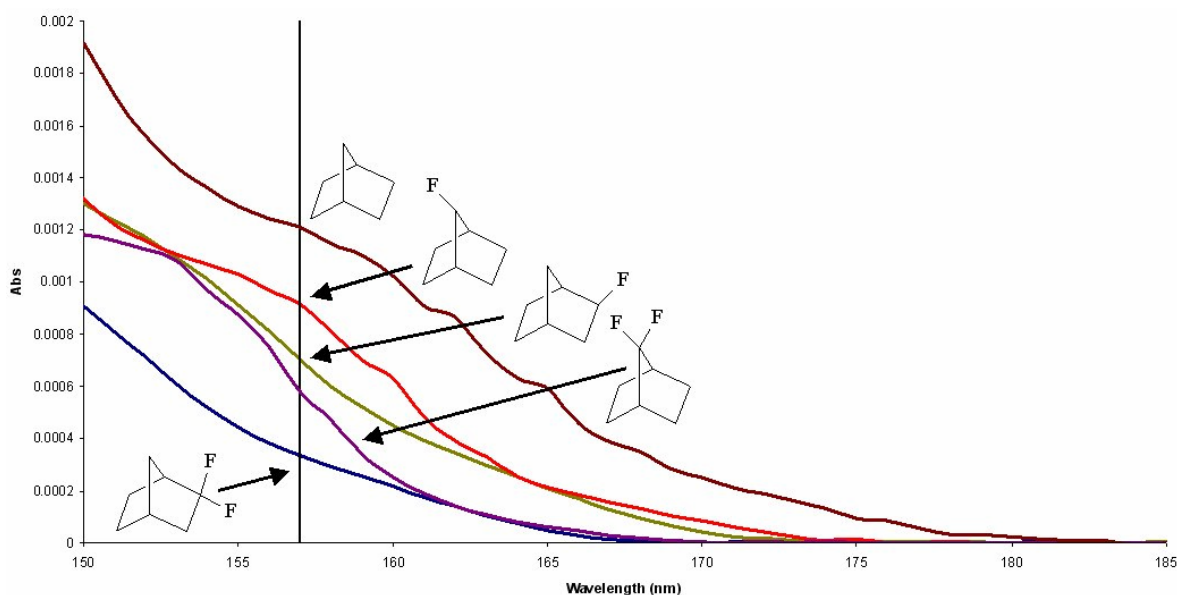


Figure 1: Selective fluorination at the 2 and 7 positions of norbornane.

The impact of alcohol protecting groups such as *t*-BOC and acetal groups has also been examined using V-UV. It is clear that the carbonyl group in *t*-BOC decreases its transparency at 157 nm. (Figure 2)

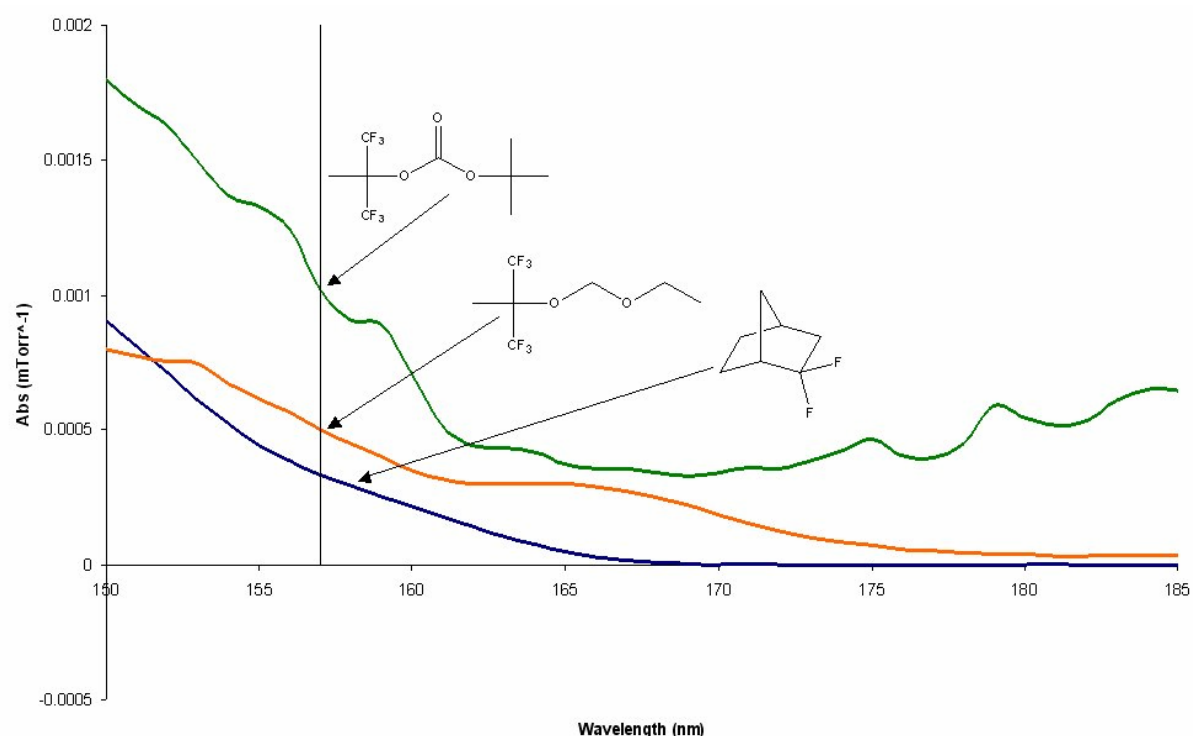


Figure 2: Absorbance comparison of acetal and *t*-BOC protecting groups, relative to 2,2-difluoronorbornane.

Fluorination of functionalized norbornanes led to several promising monomers for use in a 157 nm polymer. One of the best monomeric materials we have made to date is shown below. (Figure 3) This heavily fluorinated norbornanol has a transparency that rivals that of 2,2-difluoronorbornane.

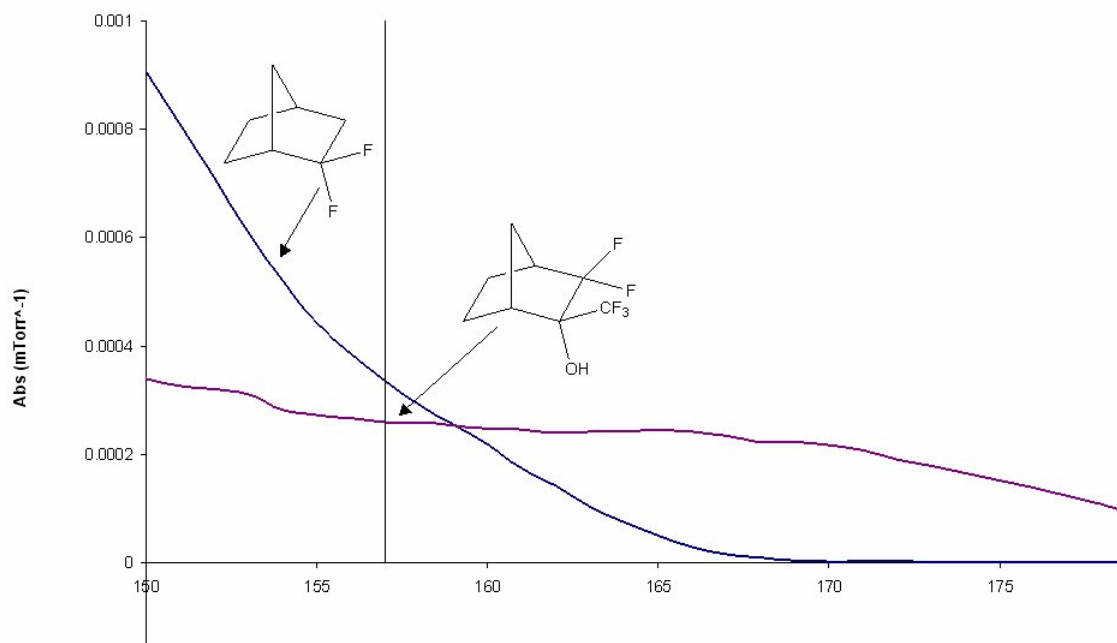


Figure 3: Transparency of a fluorinated norbornanol versus 2,2-difluoronorborane.

Sulfur-containing compounds are being pursued for their use as dissolution inhibitors, so examination of their absorbance at 157 nm was necessary. Fortunately, these compounds exhibit very low absorbance at these lower wavelengths, as shown in Figure 4.

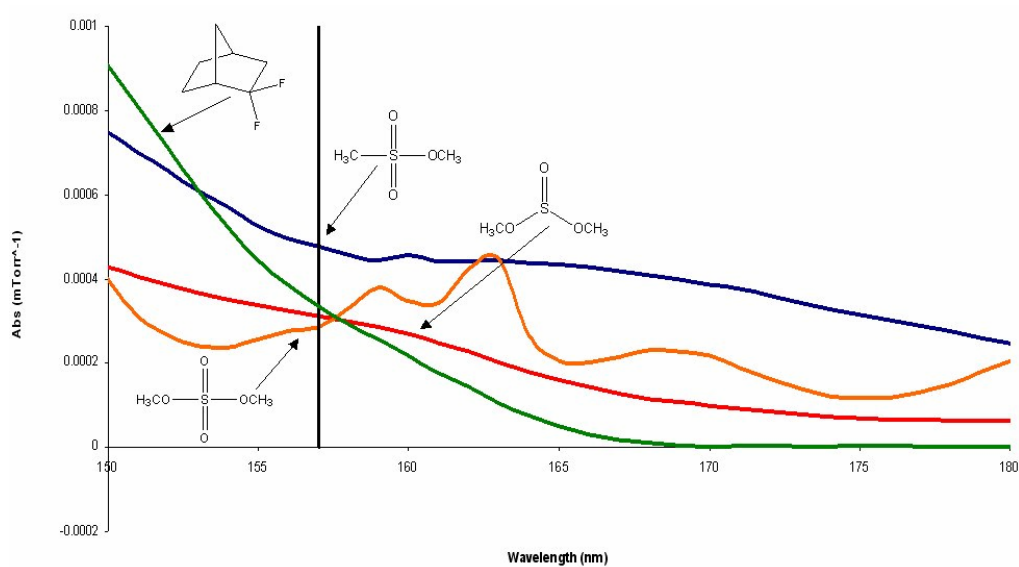


Figure 4: Sulfur-containing compounds and their absorbance at 157 nm.