Effects of Different Combinations of Halogen Additions to Anti-B18H22 Molecule on Absorption and Emission Wavelength

Yeh, Melody (School: La Cueva High School)

Downshifting, the process of absorbing high energy photons and emitting them at lower energies, is a promising approach towards improving the performance and lifespan of solar panels, especially those in space. With modifications to the structure of fluorescent molecules, the downshifting ability of these molecules can be optimized. One such way is through halogenation, which enhances the ability to absorb and emit light at longer wavelengths. By adding combinations of different halogens onto anti-B18H22, a naturally fluorescent boron cluster, absorption, emission, and the wavelength shift from absorption to emission can be increased. Halogenation of combinations of fluorine or chlorine atoms on the anti-B18H22 molecule appears to show a positive trend between the size of the halogens and the length of the emission wavelength. Although the effects of halogenation combinations on the absorption to emission shift are still unclear, the use of multiple types of halogens was able to widen the shift by more than 30 nm from the original anti-B18H22 molecule.