

Photocatalytic TiO₂ Modified Diatom Frustules for Functional Coatings

Volatile organic compounds (VOCs), including formaldehyde, are continually emitted from interior furnishings such as carpeting, flooring, furniture and cleaning agents in environments such as hospitals, schools and homes. In confined spaces with limited airflow, VOCs reduce the indoor air quality and negatively affect the health of inhabitants. Our group has developed a photoactive paint additive to continuously degrade and remove VOCs. The technology contains individual diatom frustules coated with discrete TiO₂ nanoparticles primarily on the interior biosilica walls. For TiO₂ photocatalysis to be effective in paints, degradation of airborne VOCs without degrading paint binder is necessary. By placing the photocatalyst on the interior of the diatom shell we can minimize binder degradation. In addition, by optimizing the diatom so it is exposed on the paint surface, we can allow significant exposure of airborne VOCs to the photocatalytic TiO₂ particles. This poster shows our recent work in optimization of diatom shells from the surface of interior paints in both flat and egg-shell formulations. These preliminary data suggest this type of approach to TiO₂ photocatalytic paint can help to reduce VOCs environmentally without compromising paint lifetime.