The removal of organic pollutants through buoyant photocatalyst

As the world becomes more industrial, more water is being contaminated. Most pollutants, such as biohazards, inorganic compounds, and sediments, can be eliminated from the water system using widely implemented technology, but organic compounds are complex, making them difficult to remove. Photocatalysts can break down these compounds into less harmful ones, but are not useful on large scale spills because they are dense, causing the particles to sink. Most photocatalysts have a very small particle size, which makes it very difficult to remove from water. To combat these two problems, a photocatalyst was added into an emulsion during microbubble fabrication, which creates a polymer bead as a substrate. Such beads have a large surface-area-to-volume ratio. This gives the photocatalyst maximum amount of access to the sun and the pollutant compared to a sheet. The PDMS beads have a hydrophobic nature and low-density, which makes them float on the surface of the water, allowing for easy removal. The first photocatalyst used in the beads was titanium dioxide (TiO2) because it was inexpensive and has been researched thoroughly. TiO2 beads can removed an organic pollutant from water within a few hours, but it is not very effective in visible light. Zinc oxide (ZnO) was then incorporated into the beads because it has a shown to out preform TiO2.