An Application of Titanium Dioxide Coatings to Reduce Nitrogen Oxides

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In many areas across the world, airborne pollution is a major crisis. The main factor that leads to this is fuel emissions. There are a few articles in which people are using Titanium Dioxide in building coatings. The TiO2 causes a chemical reaction with Nitrogen Oxides, which is one of the main gasses that affects pollution, when introduced to UV light. This chemical reaction turns the harmful NOx into harmless organic pollutants that can decompose. In all of my research I have found no use of the coating on roadways. I believe that if we were to apply this technology to roadways, we could stop pollution at the source. The first thing that I did was make an airtight box to conduct to conduct my testing in. I created two different coatings with different concentrations of TiO2 to see if the concentration makes a difference. I applied the coating to asphalt and concrete samples. I conducted testing by placing a sample into the airtight box, introduced fuel emissions into the box, and took a sample every fifteen seconds for ten minutes using a gas analyzer. I repeated this process for every concentration and road sample and then introduced UV light into my testing in my research. I found that the 50% concentration with UV light exposure was the most effective, and reduced the NOx by 70% on the concrete sample, compared to the control's 30%. The 50% concentration coatings were more expensive to make, but had a very substantial decrease in to NOx.

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