

# 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  $\text{TiO}_2$  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  $\text{NO}_x$  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 my testing in. I created two different coatings with different concentrations of  $\text{TiO}_2$  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  $\text{NO}_x$  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  $\text{NO}_x$ .