Enhanced Removal of Organic Pollutants with Novel Adsorbent

Mitchell Grierson

Prof Rose Amal, Dr May Lim, Dr Sanly Liu

Resources and Infrastructure for the Future

**Organic Pollutant in Water**

Ethanol + Water

Chlorine

Disinfection By-Products (Toxic)

**Current Removal Methods**

Coagulation - Ion Exchange Resin
Activated Carbon - Membrane Filtration

**Waste Products**

**Energy Intensive**

**Novel Adsorbent**

I synthesised metal oxide/ TiO$_2$ nanoparticles with the aim of enhancing the removal of NOM from drinking water

**Preparation and Testing of Novel Adsorbent**

Particles loaded in polluted water sample from Happy Valley (S.A.)

UV absorbance & organic carbon content tested before and after

**Nanoparticle Characterisation**

Transmission Electron Microscopy (TEM)

**Removal performance**

UV/Visible Spectrum Analysis

**Performance testing**

**Key Findings**

Increased surface area and smaller particle size supports performance results of my particles.

**Results**

<table>
<thead>
<tr>
<th>Property</th>
<th>Commercial TiO$_2$</th>
<th>Plain TiO$_2$</th>
<th>My Particle (Fe-TiO$_2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BET Surface Area</td>
<td>35 - 65 m$^2$/g</td>
<td>96 m$^2$/g</td>
<td>125 m$^2$/g</td>
</tr>
<tr>
<td>Average Particle Size</td>
<td>21 nm</td>
<td>10 nm</td>
<td>15 nm</td>
</tr>
</tbody>
</table>

Increased pollutant removal efficiency of my particle

**Conclusion**

The removal performance tests showed that my synthesised TiO$_2$ and Fe-TiO$_2$ nanoparticles outperformed the commercial TiO$_2$ in adsorption tests, therefore enhancing the removal of NOM from drinking water.

**Importance and Recommendations**

- More effective treatment of organic pollutants
- Less waste and more energy efficiency
- Future studies might involve testing the degradation performance of my particles.

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**Resources:** Sigma-Aldrich: Titanium(IV) oxide specification sheet.