



TiO₂ Nanocomposite Coatings with Solar-Activated Antimicrobial Properties for Water Sanitation Applications



Nanosystems Engineering Research Center for Nanotechnology-Enabled Water Treatment

Carlye N. Flores¹, Arieana Dominguez², Luis A. Barrera², Tariqul Islam², Juan C. Noveron*

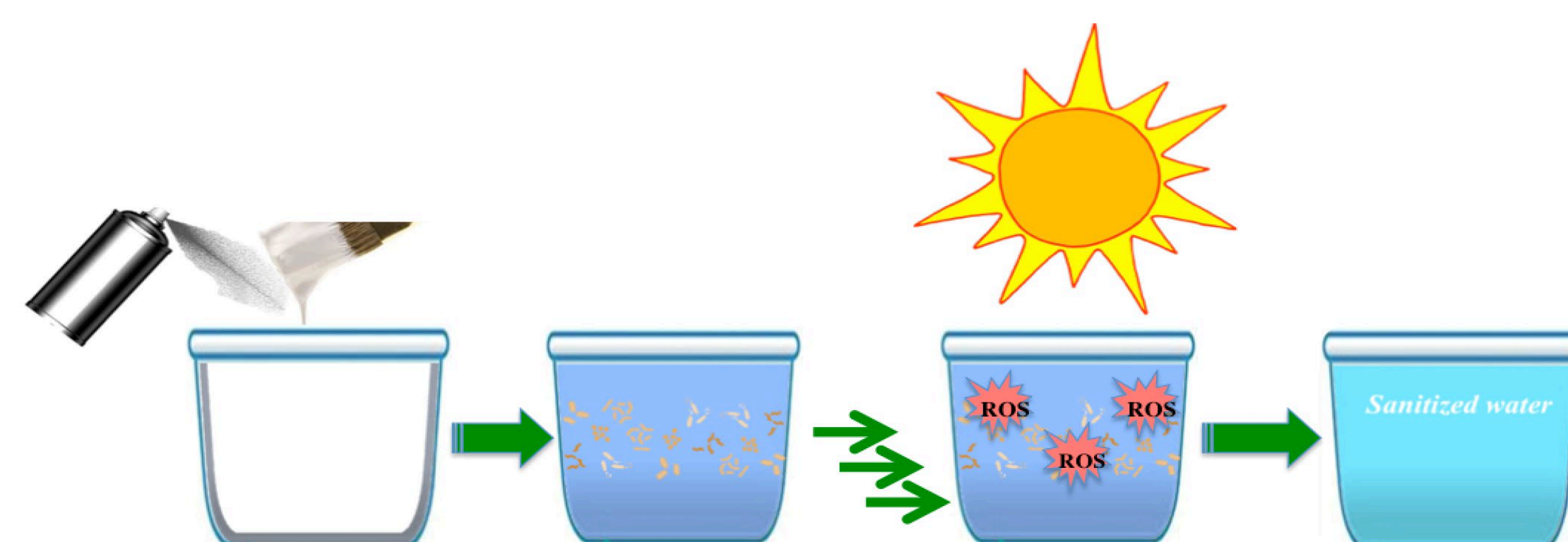
¹NEWT Research Experience for Teachers, University of Texas at El Paso, El Paso, Texas, 79902

²Department of Chemistry, University of Texas at El Paso, El Paso, Texas, 79902

Introduction

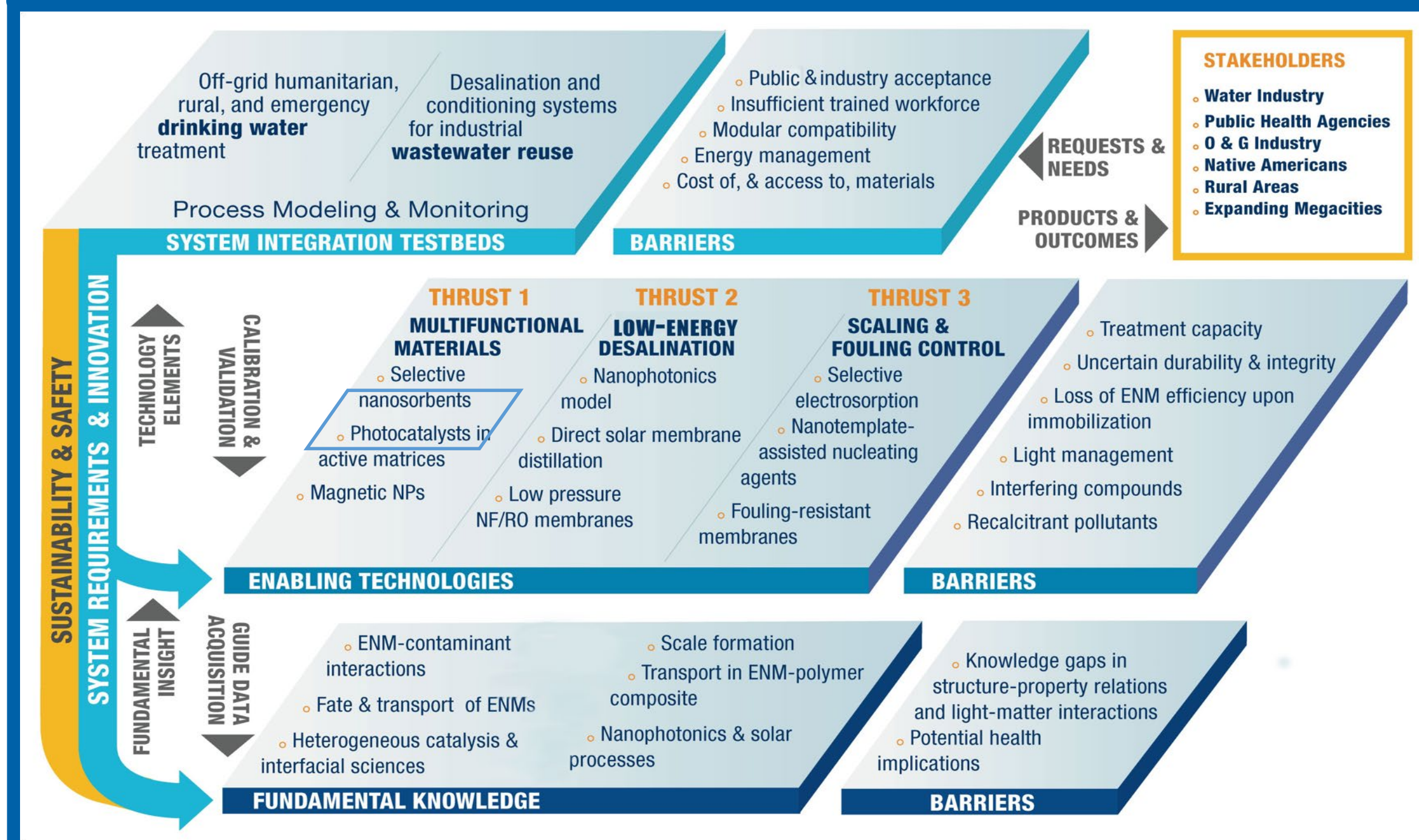
- Organic pollutants found in water sources can be toxic, carcinogenic and mutagenic to human beings and other living organisms.
- One method of treating organic pollutants is the use of conventional water filters. Often times these filters are made for single use and can alternatively be expensive.
- A current alternative method to water filters includes the introduction of harsh chemicals into affected water sources. Consequences of chemical applications include eye and skin irritation, reproductive and developmental health risks and even cancer.
- Study purpose: Create an inexpensive photocatalytic paint containing titanium dioxide (TiO₂) nanoparticles to rid water sources of organic pollutants.

Development of Photocatalytic Paint

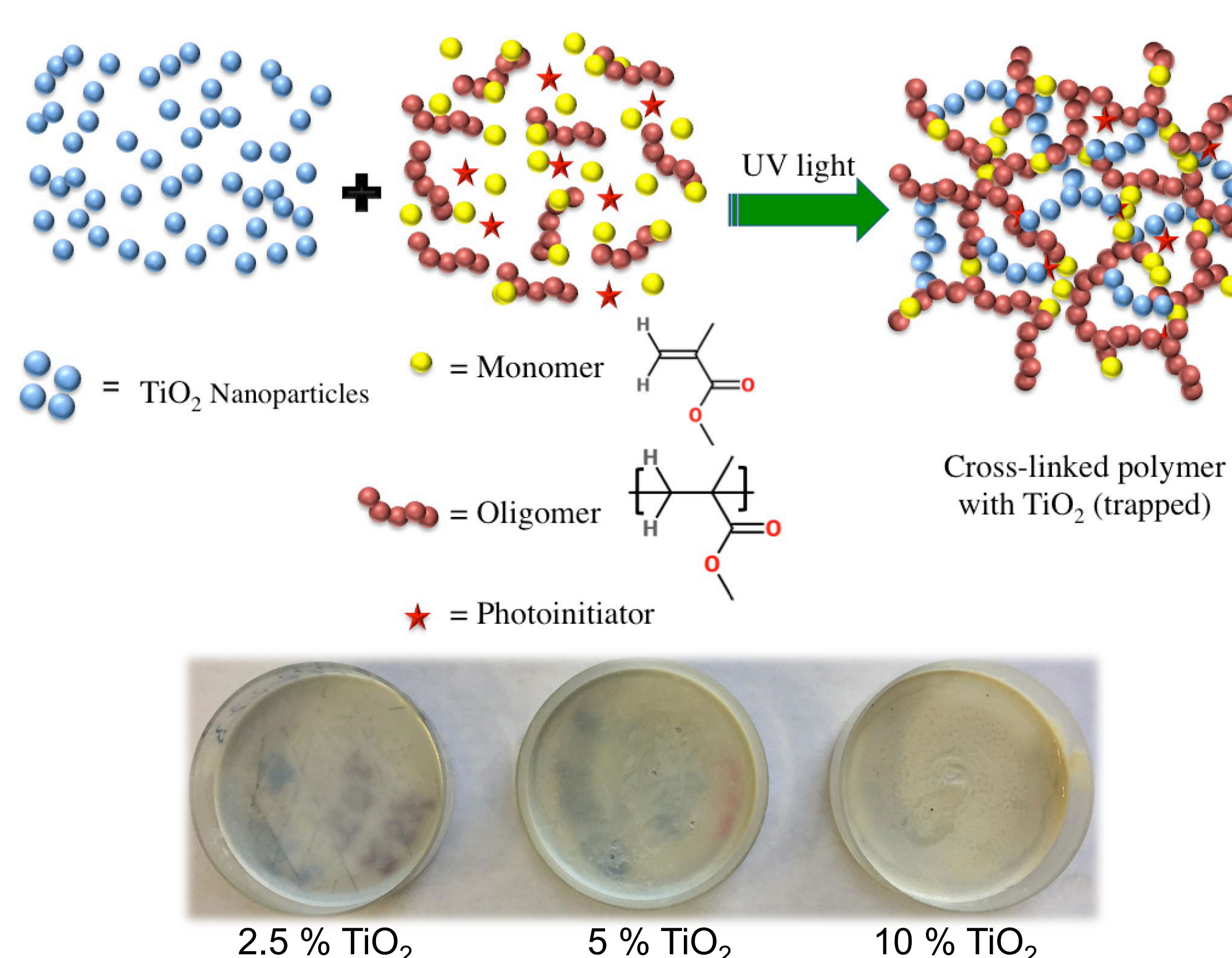


Creation of sterilized water: TiO₂ nanoparticle exposure to sun creates an ROS (reactive oxygen species) reaction which breaks down organic contaminants.

NEWT Project Application

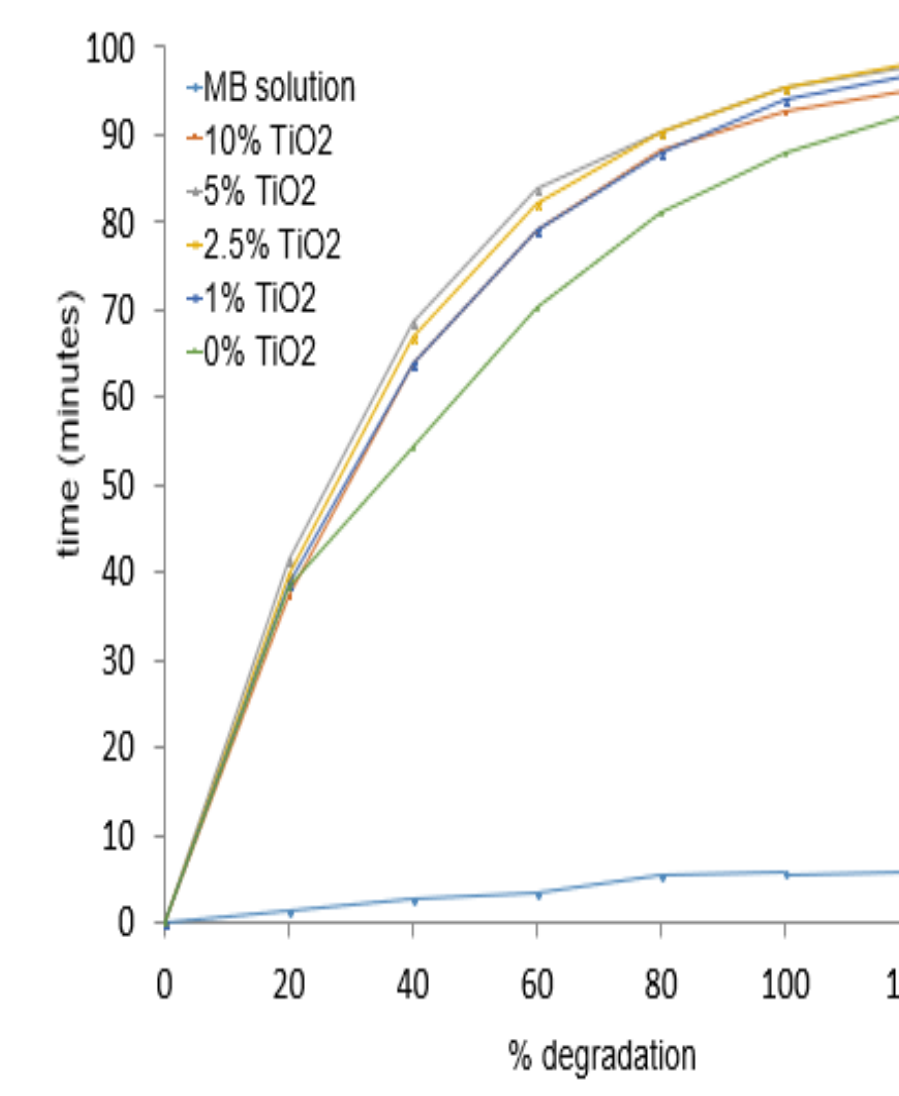
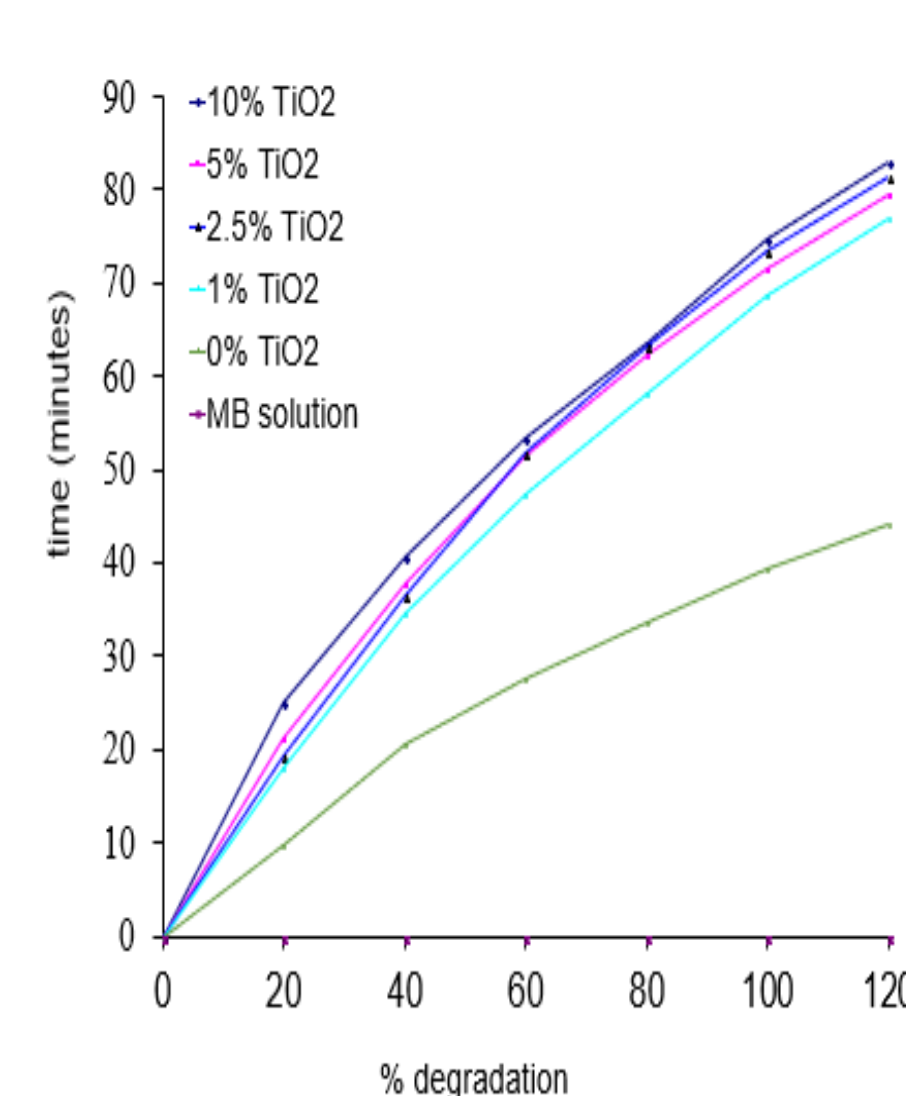
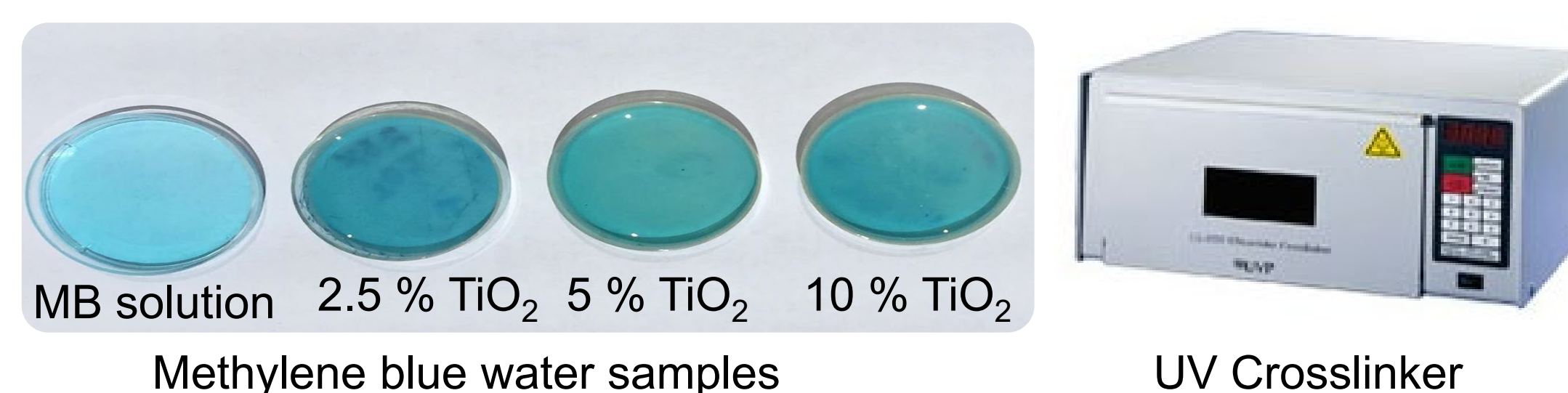


Immobilization of TiO₂ in Polymer Matrix

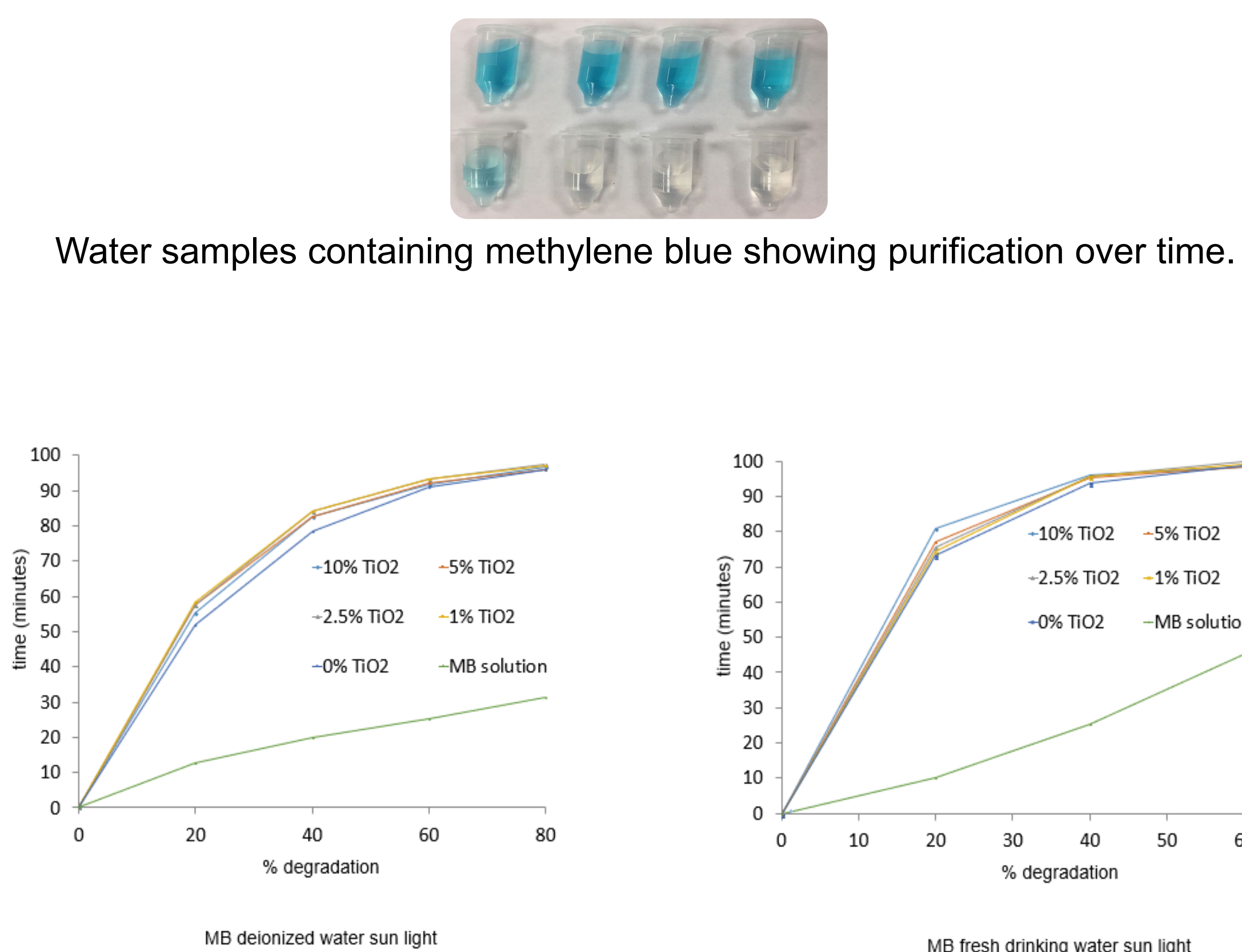


Petri dishes coated with 2.5%, 5% & 10% concentrations of TiO₂ paint

Photocatalytic degradation of MB using UV-B light



Photocatalytic degradation of MB using sunlight



Conclusion

- The use of the titanium dioxide paint efficiently removed organic pollutants from water.
- Demonstration of the continuous adsorption of organic dyes.

Future Work

- Demonstrate the use titanium dioxide paint to inhibit the growth of algae as an alternative to the use of algacides.



Algae bloom at Rio Bosque Wetlands.



Algae sample preparation using titanium dioxide-painted glassware.

References

- Shahabuddin S., Sari N. M., Afzal Kamboh M., Rashidi Nodeh H., Mohamad S. Synthesis of Polyaniline-Coated Graphene Oxide@ SrTiO₃ Nanocube Nanocomposites for Enhanced Removal of Carcinogenic Dyes from Aqueous Solution. Polymers, 8,9(2016): 305.

Acknowledgements

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