

NOVEL SOLVENT SHIFTING TECHNIQUE FOR SUSPENDED CeO₂ NANOPARTICLES FROM AQUEOUS TO ORGANIC SOLVENT MEDIA. Laura Herder, Lmh2725@rit.edu; Thomas Allston*, Tdasch@rit.edu; Dr. Kenneth Reed*, Kreed@rochester.rr.com

Cerium dioxide nano-particles have shown improved gas mileage in diesel engines by about 10 %. These particles are produced in an aqueous environment which is incompatible with diesel. The purpose of this research involves removing the water and at the same time solvent shifting these cerium dioxide particles into an organic solvent without changing any of the nano-particles properties. This method uses dialysis bags or a diafiltration column and a mixture of glycols to solvent shift. In other literature, this technique of dialysis bags and a diafiltration column, has been used to shift a material from an organic solvent to an aqueous solvent, but never the reverse. After this solvent shifting procedure is complete, the cerium nano-particles are suspended in the mixed glycol solution which is soluble in the required organic solvent. Using this approach 94% of the water is removed after the nano-particles are in the glycol solution and once added to the diesel the water content is less than 5 ppm. This additive is not only environmentally friendly because it improves gas mileage and reduced emissions, but also because the waste created in the process is able to be regenerated into the starting materials.