

**UNIVERSITY OF RHODE ISLAND**  
**Department of Chemistry**  
**VIRTUAL SEMINAR**

**2:00 PM, Friday, November 13, 2020**

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***“Zinc (II) oxide catalysis for the  
degradation of organic pollutants in  
water”***

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## **Zinc (II) oxide catalysis for the degradation of organic pollutants in water**

Zinc (II) oxide is a commonly used semi-conductor catalyst in water purification systems. This metal catalyst is often used in photocatalytic systems due to a wide band gap energy of around 3.4 eV allowing for absorption of wavelengths of light around 350 nm. The most common structure of zinc (II) oxide is the wurtzite crystal structure which has no inversion center and has polarized Zn-O bonds leading to a strong piezoelectric character. Light or mechanical force can be used to excite electrons in the valence band of zinc (II) oxide and promote them to the conduction band creating an electron/hole pair. These electron/hole pairs can then react with water and oxygen to form superoxide and hydroxide radicals which can then break down organic pollutants to carbon dioxide, water, and inorganic molecules. Due to the complex nature of polluted water systems organic dye solutions in water are often used as models for water purification studies. This presentation investigates the effectiveness of zinc (II) oxide catalysts in photocatalytic and piezocatalytic systems for the degradation of model water pollutants such as methylene blue dye. It will be shown that combining the piezoelectric character and photocatalytic properties of zinc (II) oxide can help prevent the recombination of electron/hole pairs and thus create a more efficient catalyst than using light or mechanical energy alone.