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# Seminar

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## Institute for Plasma Research

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**Title :** Milling effect on the performance of photocatalytic dye degradation using different photocatalysts

**Speaker:** Dr. Rajashree Sahoo

Institute for Plasma Research, Gandhinagar

**Date :** 25th April 2022 (Monday)

**Time :** 10.30 AM

**Venue :** Online - Join the talk:

[https://lobby.ipr.res.in/Rajashree\\_Sahoo\\_PDF\\_EXt\\_talk](https://lobby.ipr.res.in/Rajashree_Sahoo_PDF_EXt_talk)

### Abstract :

Rapid industrialization has brought hazardous pollutants into water. These pollutants are generated from various chemical industries such as textile and pharmaceutical industries. These textile industries are heavily dependent on polymeric and synthetic dyes. The industrial effluents from dye industries are harmful for the marine and aquatic life. Therefore, guidelines issued by central and state pollution control boards to textile industries are very strict in nature. To address such problems, suitable dye degradation catalyst developments are on-going in the various part of our country. In this work, Commercial ZnO powders were grinded using ball milling. These powders were characterized by using X-ray diffraction analysis, Dynamic light scattering (DLS), Photoluminescence (PL) and Raman spectroscopy. From DLS study, it reveals that the particles are of sizes 1600 nm, 590 nm and 172 nm for ungrinded, grinded (2hrs) and grinded ZnO powders (4hrs) respectively. Studies on UV- photocatalysis behavior of these powders were done through their use in crystal violet dye decomposition. Particularly, the reaction kinetics and reaction rate are estimated by monitoring the dye decomposition activity with respect to UV exposure time. The kinetic is found to be pseudo-first order with the reaction rate constant (kinetic constant)  $0.27 \text{ min}^{-1}$ . In the comparative study it has been demonstrated that 4hr grinded ZnO powders can show 3.3 times higher dye degradation activity with respect to ungrinded ZnO and 2.2 times higher than 2hr grinded ZnO. The used ZnO powders are of extremely low cost, so this material can be found to be a better choice for photocatalytic dye decomposition applications. Similarly, the photocatalytic dye degradation study was done using  $\text{TiO}_2$  and  $\text{Li}_2\text{TiO}_3$  powder under UV exposure. The details of the work done and the future work will be discussed.

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