

# **PADERBORN PHOTONICS LECTURE**

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## ***Functionalization of ZnO by Cadmium and Cobalt doping***

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Abstract:

Wide bandgap semiconductors are strategic systems for high power electronics, transparent electrodes, diluted magnetic semiconductors and gas sensors. Among many systems, oxides present a versatile class of materials which can be managed to achieve related functionalities. Therefore, in order to introduce functional properties, the choice of element doping is an attractive topic as it strongly depends on synthesis method.

For large scale production, the deposition of thin films by spray pyrolysis presents relevant aspects as versatility, low-cost route and large area deposition. We present here two topics related to ZnO doping concerning photoconductivity and gas sensing phenomena with a brief explanation of synthesis technique employed to grow polycrystalline thin films. For the first case, we investigate the photoconductivity response of ZnO as a function of atmosphere as well the effect of Cd introduction in ZnO for temperature-dependent experiments. ZnCdO system shows a transition from positive to negative photoconductivity when Cd concentration is around 0.70. The second case is related to ozone gas sensors development, which is strongly affected by the presence of Co. Measurements in a wide range of concentrations from 20 to 767 ppb exhibit a good repeatability and total reversibility after consecutive exposures. The selectivity towards ozone is observed in comparison to NO<sub>2</sub>, NH<sub>3</sub>, and CO gases even at low levels.