Title:	Investigating the role of Structural Parameters Influencing Photocatalytic and Electrocatalytic Behaviour of Binary and Ternary Metal Oxides
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Abstract:	With the depletion of fossil fuels and continuous growth in the world's population, the energy demand has continued to surge which has encouraged the development in the field of catalysis for environmental remediation and energy applications. Currently, research pertaining to photo and electrocatalysis techniques has been under investigation for tackling global energy production such as hydrogen evolution(HER), oxygen evolution reaction (OER), and environmental problems such as CO 2 reduction, dye degradation, etc. Over the past few decades, tremendous efforts have been made in developing new materials for photo and electrocatalysis. Along with the development of novel materials, there are several factors from the material point of view which affect the rate of photo and electrocatalytic behavior of the catalyst which includes size, morphology, surface area, exposed facets, electronic structure, crystal structure, orientation, electric polarization, etc. The current thesis focuses on the effect of various parameters viz. size, morphology, nature of exposed facets, crystal structure, orientation, electric polarization on the photo/electrocatalytic reaction. The first chapter of the thesis discusses the basic introduction regarding photo and electrocatalytic water splitting reaction which has been used for energy production and environmental remediation. Also, the importance of various structural parameters regarding photo and electrocatalytic water splitting reactions has been discussed. Keeping in view the effect of the nature of exposed facets on photocatalytic activity, the second chapter of the thesis, discusses the role of ionic flux on the exposed surfaces of ZnO and their correlation with photocatalytic dye degradation activity. ZnO was synthesized through the decomposition of zinc oxalate in the absence and presence of various fluxes such as NaCl, KCl, NaCl-KCl, and Na 2 SO 4 . To find exposed surfaces of the sample synthesized above, the value of texture coefficient of four highly intense planes was calculated from PXRD data. Texture coefficient is the measure of the degree of preferred orientation towards a particular plane. The presence of flux (NaCl, KCl, a mixture of NaCl–KCl, and Na 2 SO 4) during decomposition of the oxalate precursor led to the preferential growth of (11 0) planes as compared to ($10\bar{1}$ 0) surface. The value of texture coefficient was found to be high for the (11 0) plane when the decomposition was carried out in the presence of a mixture of NaCl and KCl when compared to their counterparts. A decrease in the value of texture coefficient for the (11 0) plane was observed when Na 2 SO 4 was used as a flux, which was similar to the value obtained for ZnO synthesized in the absence of flux. The observations from the analysis of texture coeffici
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