and power density, improved safety, longer lifetime, and lower cost. As a result, recent studies have investigated enhanced electrochemical charge storage in electrodes that contain intentional structural defects (e.g. vacancies, interstitials). In this talk, I will introduce our work on a novel approach to introduce defects in electrode materials via ion irradiation, which is known to produce an excess of defects in a material. In this work we investigate the irradiation effect on structure and electrochemical response of TiO_2 nanostructured thin films through proton ion irradiation. In addition, we investigated heavy ion irradiation on TiO_2 single crystals to elucidate the effects of irradiating species and crystallographic orientation on defect production and microstructure evolution. We have observed defect generation upon irradiation in both nanostructured and single crystal TiO_2 samples and investigated the relationship between irradiation-induced defects and the electrochemical properties of the TiO_2 samples.

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