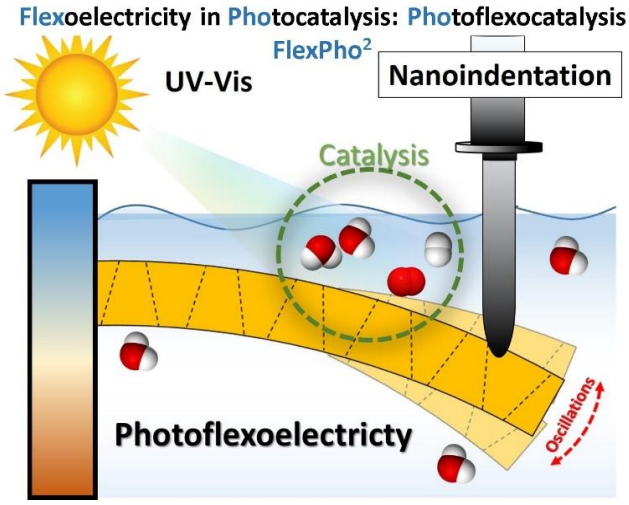
Flexoelectricity is an effect that has gathered increasing attention in the past decade, due to its increasing dominance at the nanoscale. Flexoelectricity appears as a result of inhomogeneous strain applied to a nanomaterial. Contrary to other phenomena, such as piezoelectricity and ferroelectricity, this effect is not restricted by any geometry or crystalline order, which makes it quite important in energy harvesting and ideal for nanoelectromechanical resonators. Recently, the existence of the so-called photoflexoelectric effect has been shown. This discovery is of tremendous importance for the energy production field since the measured photo enhancement was thousands of times higher than the initial flexoelectric response. The understanding of this effect and its possible control could have game-changing implications for energy production and Catalysis.

In this project, the investigation of the photoflexoelectric effect on Strontium Titanate (STO) is proposed. STO is a well-known flexoelectric material, which has also been extensively researched as a photoanode in catalysis. Therefore, it aims to basic and fundamental research in the field. The project profits from a unique experimental set-up, developed by the PI, which allows the direct measurement of flexoelectric response by submicrometer oscillations. Additionally, with the successful application of the SONATA project, it might be capable of measuring this effect in liquids and under ultraviolet light irradiation.

The project aims to investigate and determine the photoflexoelectric coefficient in STO and Barium Titanate films (BTO) towards photoflexoelectric catalytic applications. The project proposes two approaches to achieve its goals: 1) studying and modifying the photocurrent response photocurrent generated by STO bulk and BTO/STO films by nanoindentation patterning. 2) The direct observation of photoflexoelectric response of STO cantilevers during irradiation and mechanical stimulation. It focuses on their catalytic performance towards model dye decomposition and photocatalysis experiments. The successful SONATA project will provide pioneering studies and reference publications showing the applicability and potential of the photoflexoelectric in catalysis and energy production. A topic that, without a doubt, will be heavily studied in the next decade.



General Illustration of the aim of the **FlexPho^2** project for exploiting the photoflexoelectric effect clean energy production and catalysis.