## Strain-driven Photocatalysis Modulated by Polydopamine Interfaces

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Nowadays, polydopamine (PDA) is a rather well-known biomimetic polymer with a vast range of applications. In this talk, I will explain the development of multifunctional catalysts using a mechanism we have termed interfacial temporal control. The research shows that the thickness of a polydopamine coating on zinc oxide tetrapods (ZnOT) determines the material's flexophotocatalytic selectivity, shifting the preference toward either oxidative or reductive pathways. The presentation will provide experimental evidence of a thickness-dependent efficient charge-transfer interface. We will show how a PDA configuration promotes the generation of hydroxyl radicals, which are highly effective at degrading organic pollutants. Conversely, we show that a different configuration functions as a capacitive electron sink. This physical change temporarily decouples the electron and hole pathways, thereby suppressing recombination and increasing hydrogen evolution rates. The presentation will further show that both processes are driven by the photo-flexoelectric effect in ZnOT structures, offering a reliable method for engineering catalysts with programmable selectivity for specific environmental and energy applications.

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