

# Synthesis and optical properties of bismuth doped NaTaO<sub>3</sub>

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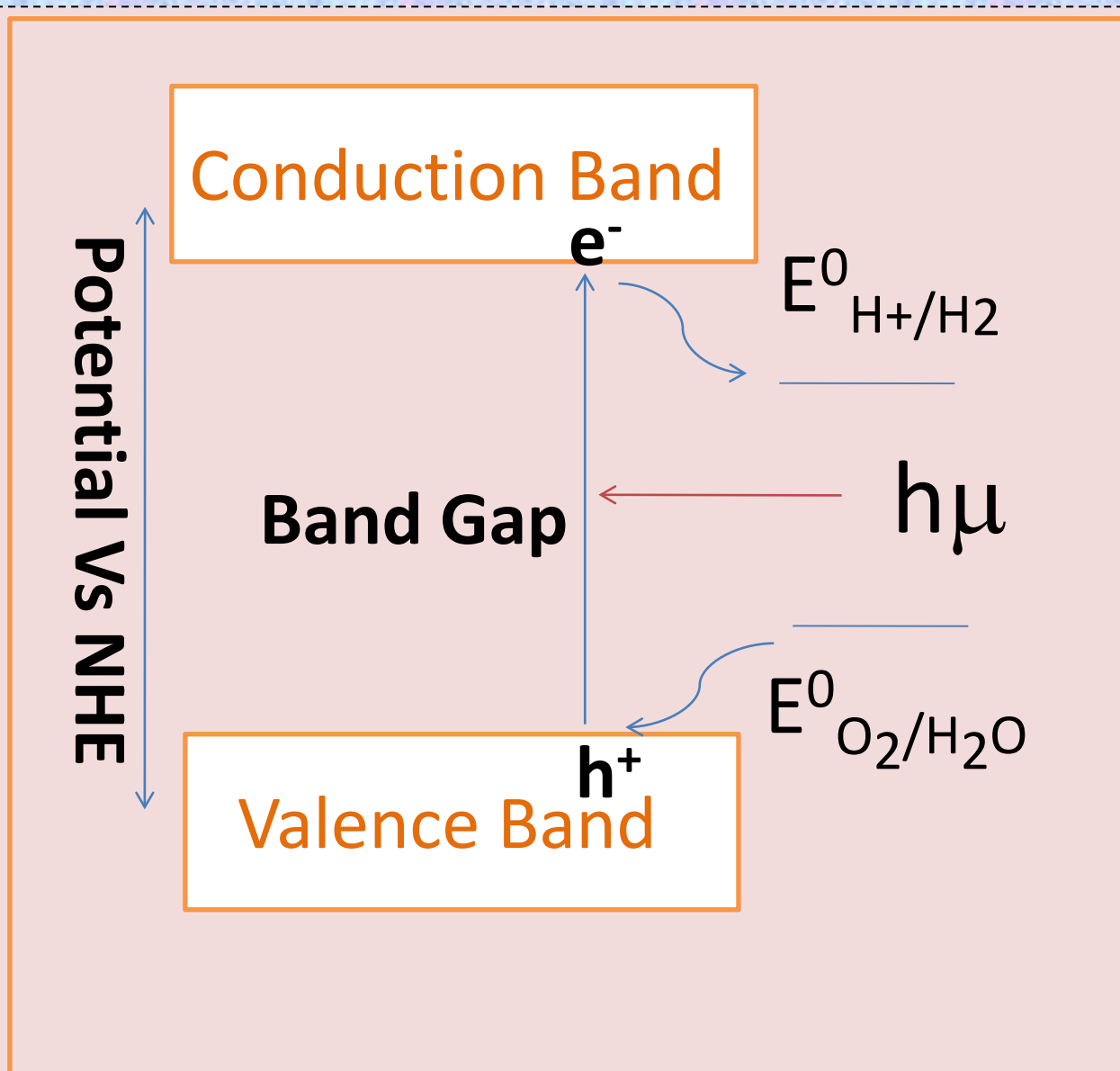
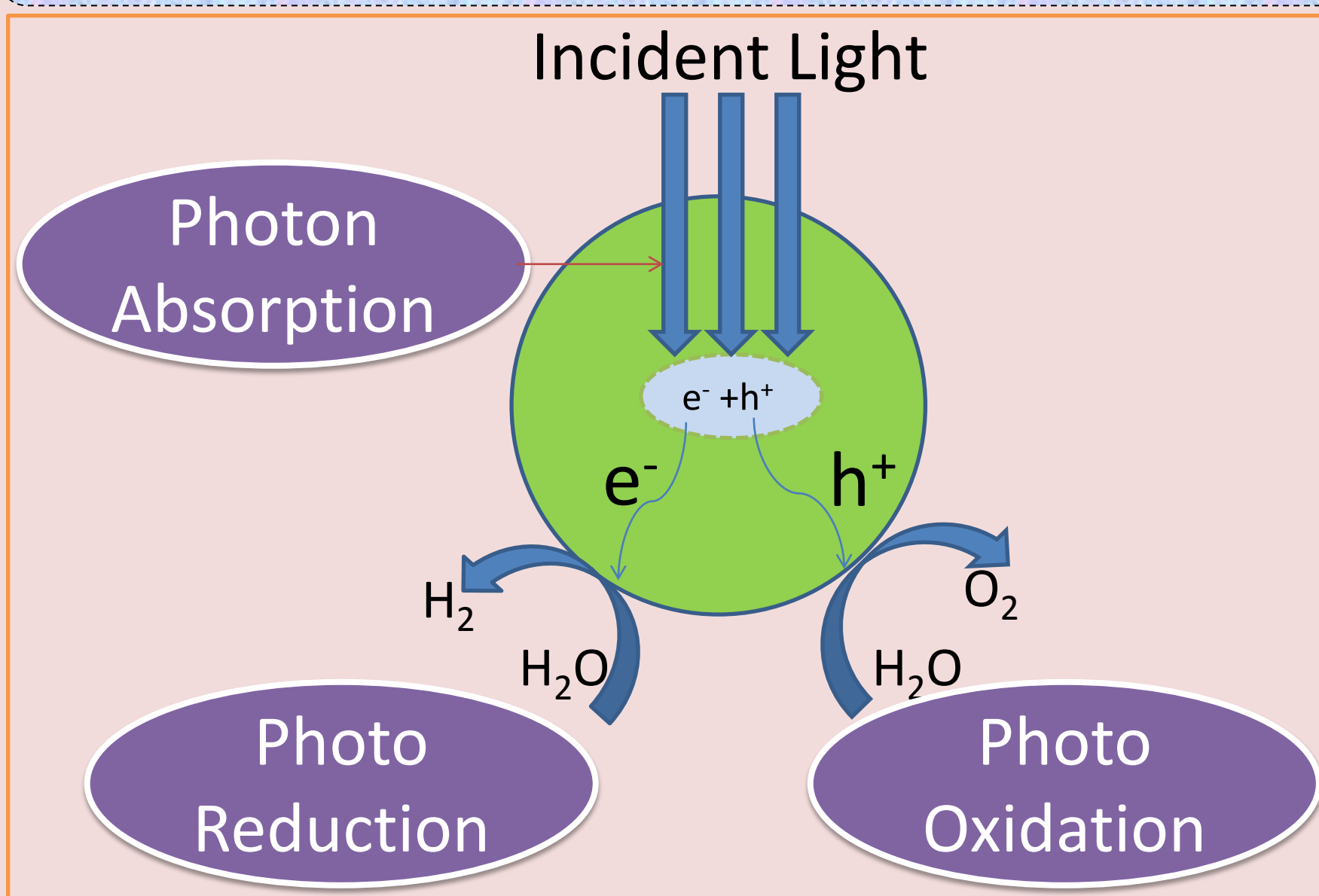
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# Synthesis and Optical Properties of Bismuth Doped $\text{NaTaO}_3$

## Introduction and Motivation



$\text{NaTaO}_3$  is an efficient water splitting photocatalyst in UV region but not useful in visible light region limited by its high band gap of 4 eV.

Use  $\text{NaTaO}_3$  as the host material, by suitable doping, visible light active photocatalyst can be designed.

### Objectives

The main objective of this project is to synthesize Bi doped  $\text{NaTaO}_3$  and to investigate the structural and optical properties of the synthesized Bi- $\text{NaTaO}_3$ .

### Synthesis

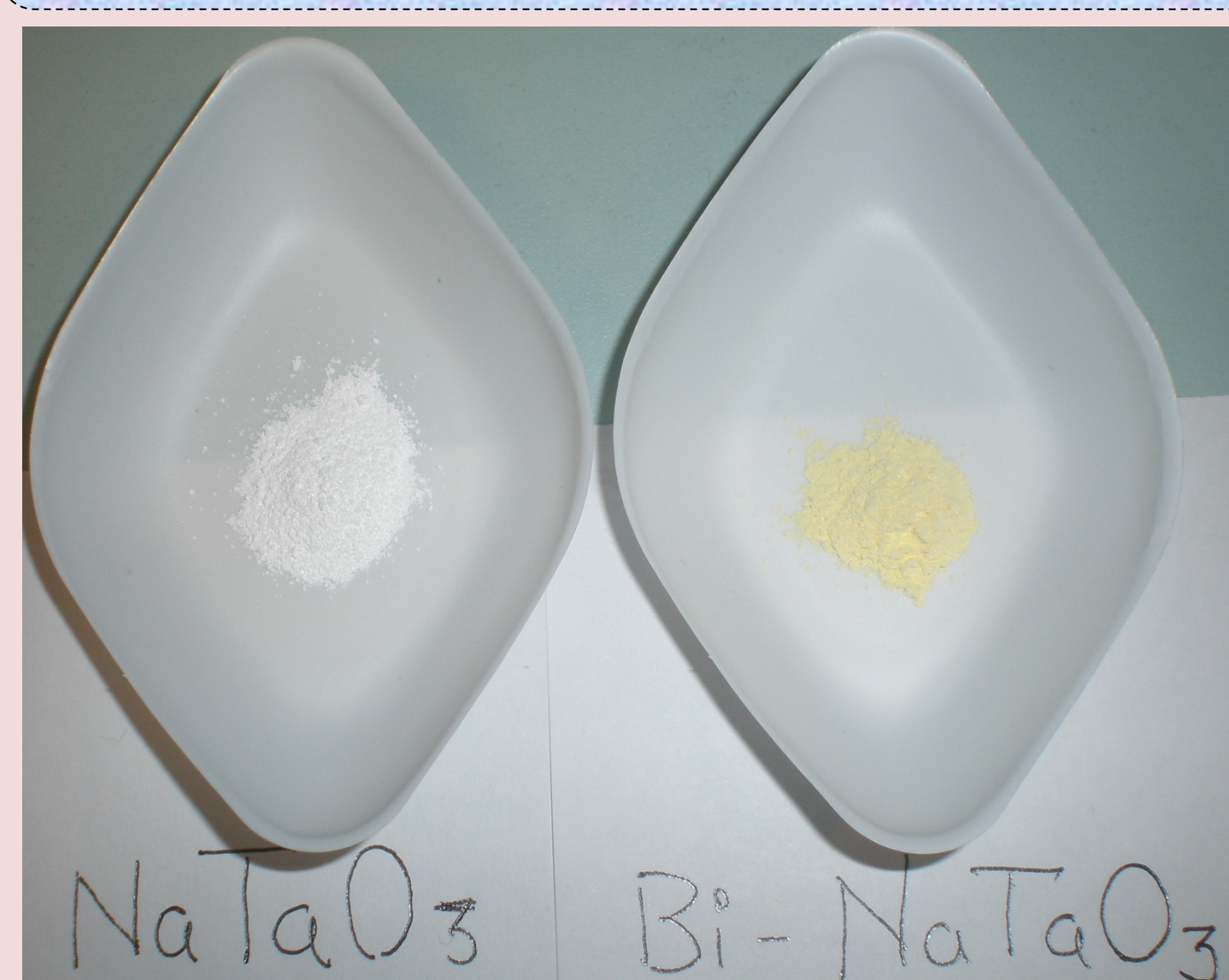
The Bi doped  $\text{NaTaO}_3$  is synthesized by solid state route with starting materials  $\text{Ta}_2\text{O}_5$ ,  $\text{Na}_2\text{CO}_3$ ,  $\text{Bi}_2\text{O}_3$  (mole ratio=1:1:0.05) sintered at  $900^\circ\text{C}$  for 10h

### Characterization

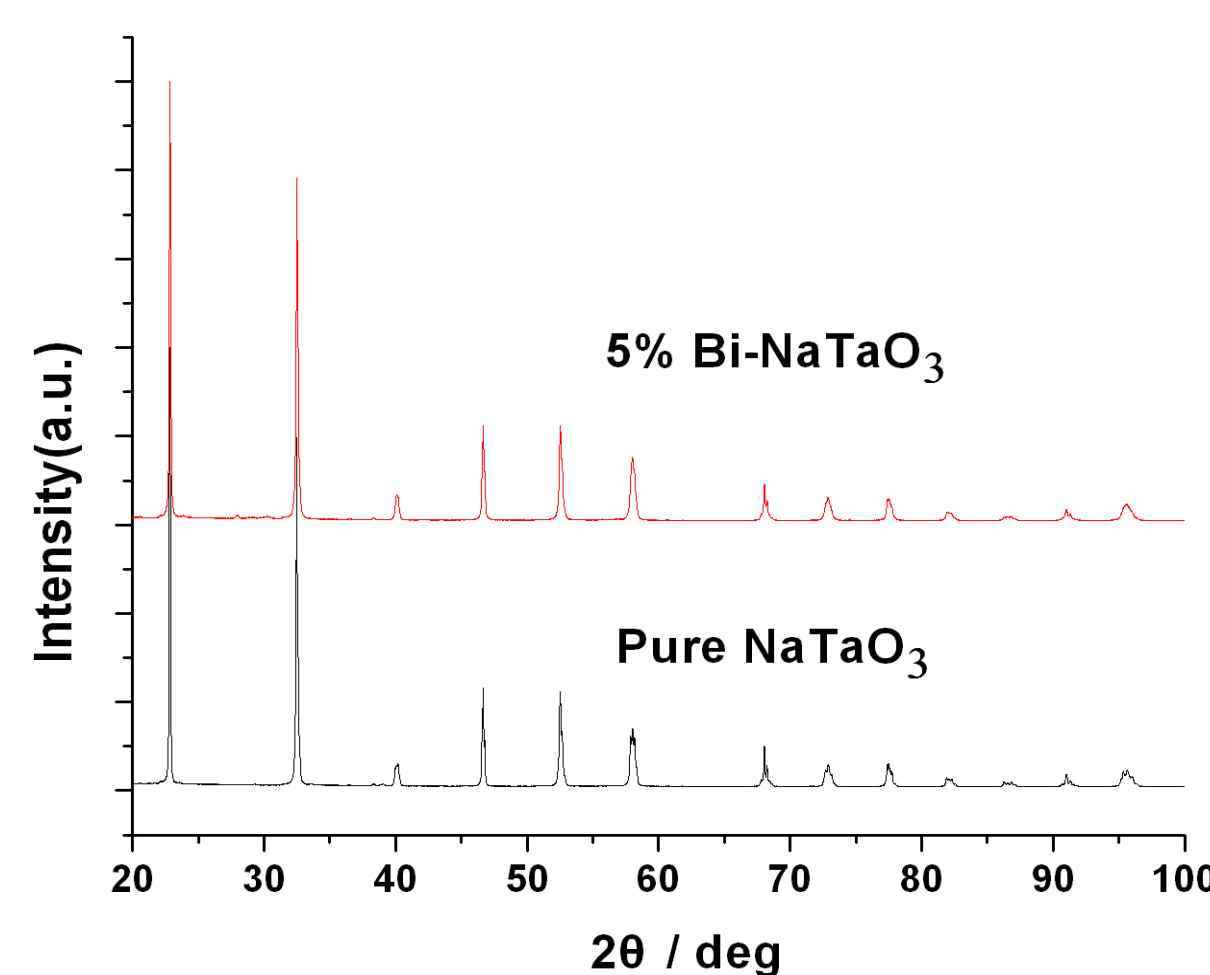
X-Ray Diffraction (XRD) is used to determine the crystal structure

Diffused Reflectance Spectroscopy is used to examine the optical absorption

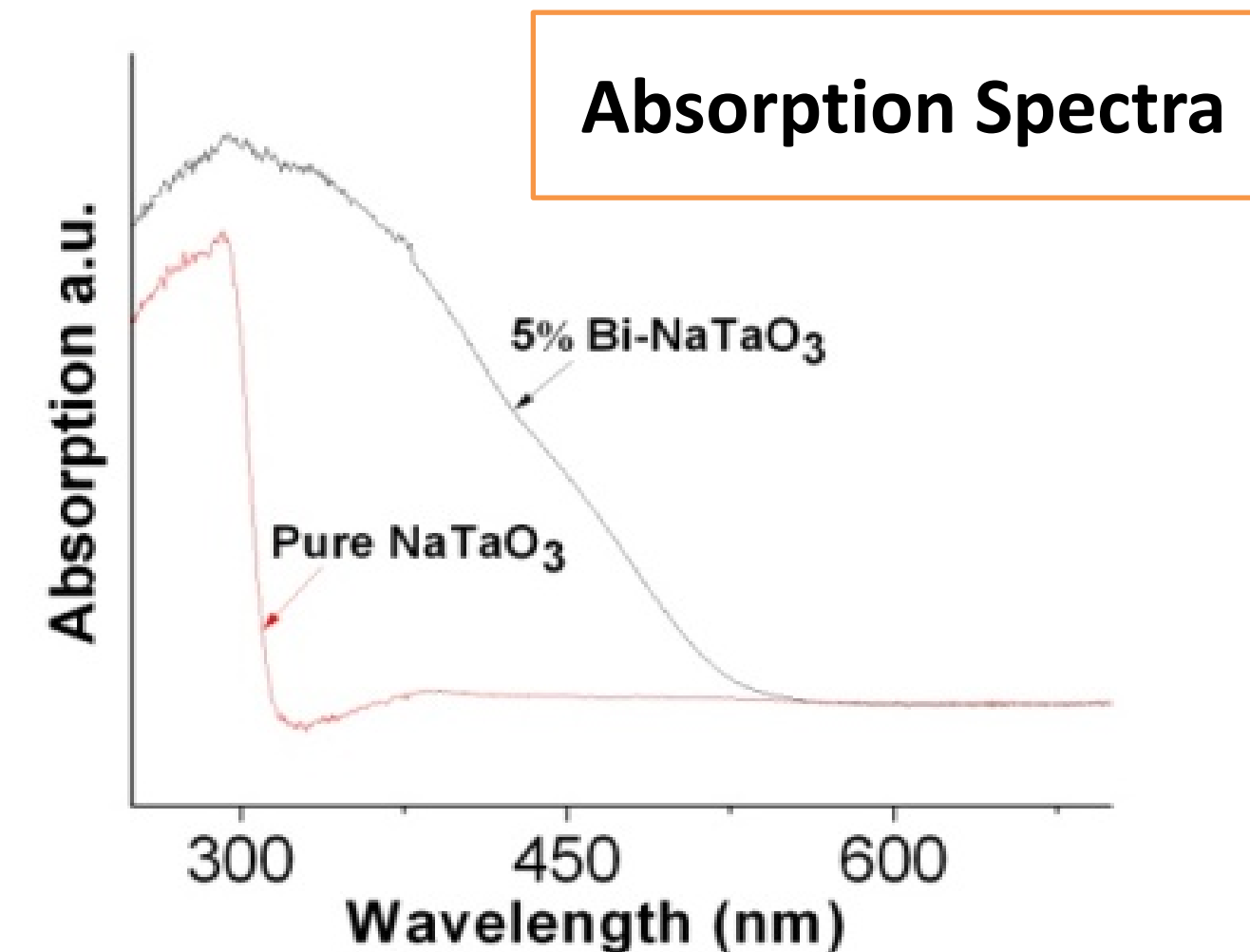
## Results and Discussion



A comparison on the color of the powder: pure  $\text{NaTaO}_3$  is white while Bi- $\text{NaTaO}_3$  is yellow.



XRD patterns show that the synthesized power is impurity free, bismuth occupies lattice sites of pure  $\text{NaTaO}_3$



Bi- $\text{NaTaO}_3$  absorbs light with wavelength  $\lambda > 420\text{nm}$  which means that the band gap has been narrowed to visible light region

## Conclusion

The bismuth doped  $\text{NaTaO}_3$  is impurity free with an energy band gap capable of absorbing visible light. It holds the potential to be a new photocatalyst for visible light photocatalytic activity.