

# " Degradation of methylene blue dye by single perovskite materials "

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## Introduction

✓ Synthetic organic dyes such as Methylene blue (MB) is used in many fields including the textile industry. Because of these pollutants, the wastewater contamination is becoming one of the greatest environmental threats. [1]

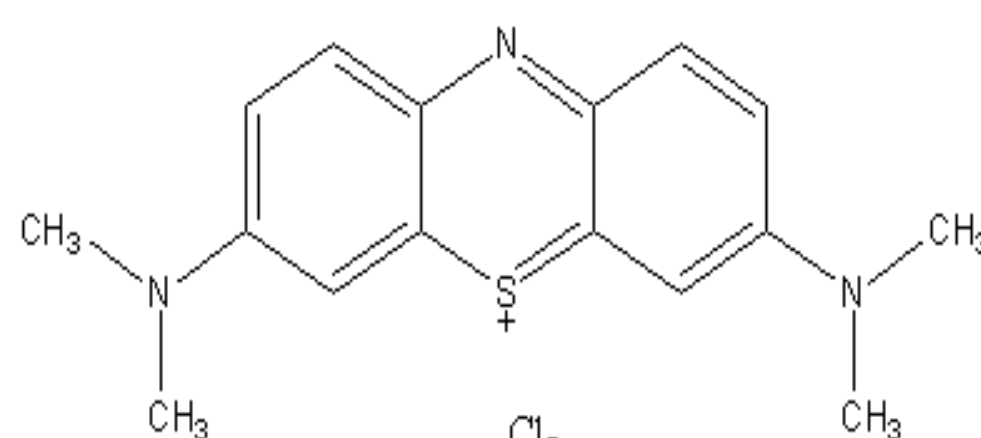


Fig.1 Structure of methylene blue.

✓ To solve this issues, perovskite nature oxide materials be based on transition metals were reported as a skilled photocatalyst for overall water splitting. [2]

## Objective

✓ In this work, the effective of the perovskite BaTiO<sub>3</sub> (BT) prepared by sol-gel method for the degradation of methylene blue under ultraviolet irradiation has been studied.

## Experimental details

- ✓ Preparation of BaTiO<sub>3</sub> by sol-gel method using barium acetate and titanium isopropoxide. [3]
- ✓ Characterization of BaTiO<sub>3</sub> perovskite by DRX, Raman, FTIR and BET.
- ✓ Degradation of MB (15 ppm) under ultraviolet irradiation of 256 nm without and with the presence of BaTiO<sub>3</sub> with two different concentration.
- ✓ The study of the MB degradation is carried out by measuring the absorbance at 665 nm of the solutions taken after specific reaction times.

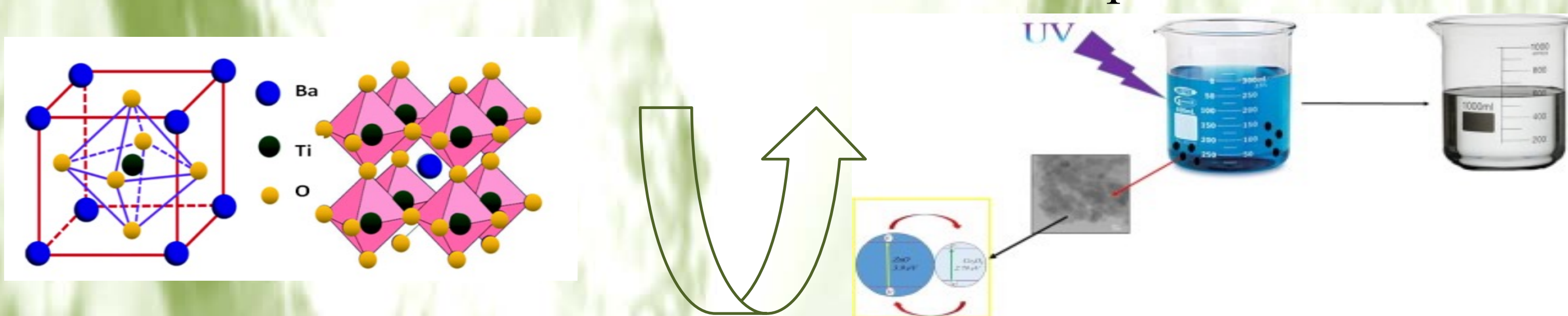


Fig.3 BaTiO<sub>3</sub> crystallographic structure and its use for MB degradation by photocatalytic process. [4]

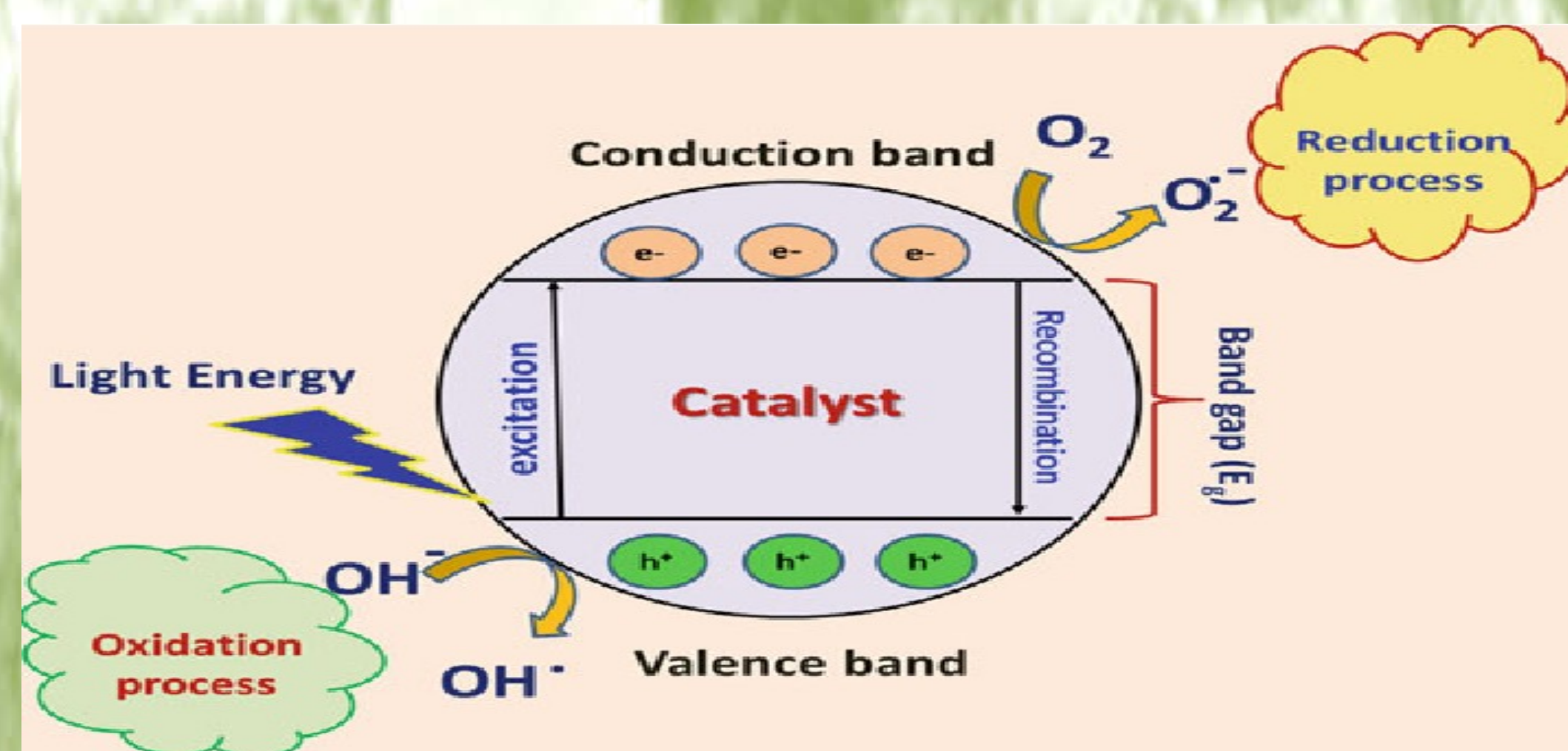


Fig.4 Photocatalytic mechanism..

## Results and discussion

- ✓ The structure of BaTiO<sub>3</sub> starts to appear at 600 °C.
- ✓ All material characterization results show that tetragonal BaTiO<sub>3</sub> were successfully synthesized by sol-gel method.
- ✓ The best well crystallized structure of perovskite BaTiO<sub>3</sub> was the one heated at 900 °C for 40 min with a specific area of 9 m<sup>2</sup>/g and it was used for the degradation of MB 15 ppm.

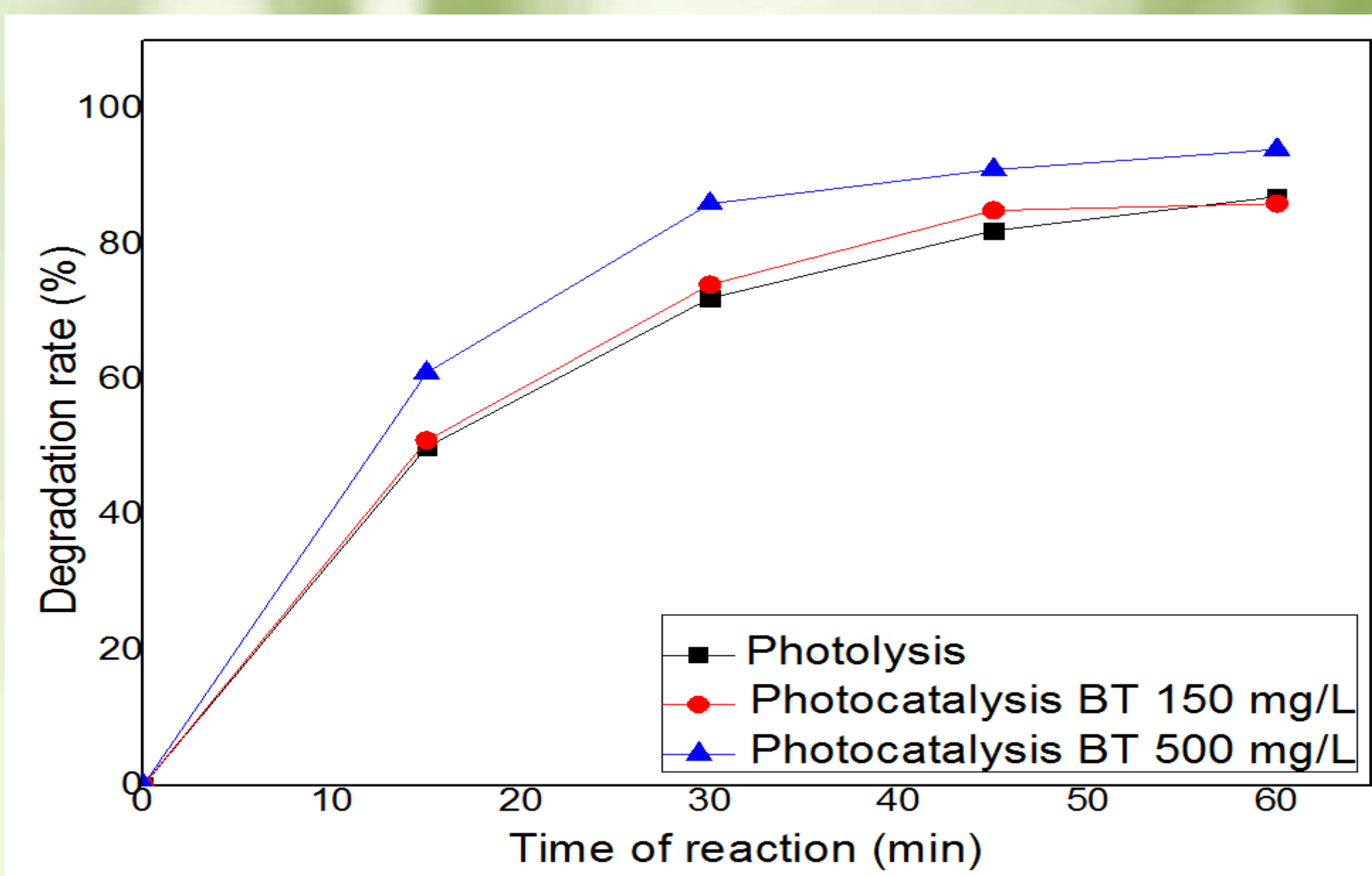


Fig.5 Degradation results of MB (15 ppm) with photolysis and photocatalysis processes.

Degradation rate (%)	Photolysis	Photocatalysis BT 150 mg/L	Photocatalysis BT 500 mg/L
After 30 min	72 %	74 %	86 %
After 60min	86 %	86 %	94 %

- ✓ The degradation performance of MB under ultraviolet irradiation of 256 nm in the presence of catalysts with a concentration of 150 mg/L has not improved by reason of the small ratio between catalyst and dye concentrations.
- ✓ While the increase in catalyst concentration increased the degradation rate, the concentration used in this work still low comparing to that used in other articles. (1 g/L)[5]

## Conclusion and prospects

- The concentration of the catalyst plays a major role in the deterioration of the pollutant and the perovskite material has shown a good performance in the degradation of the textile dye.
- For the studies that follows : variation and optimization of operating conditions such as: dye and catalyst concentration, lamp frequency and power and the use of solar radiation instead of the lamp in photocatalytic processes.

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