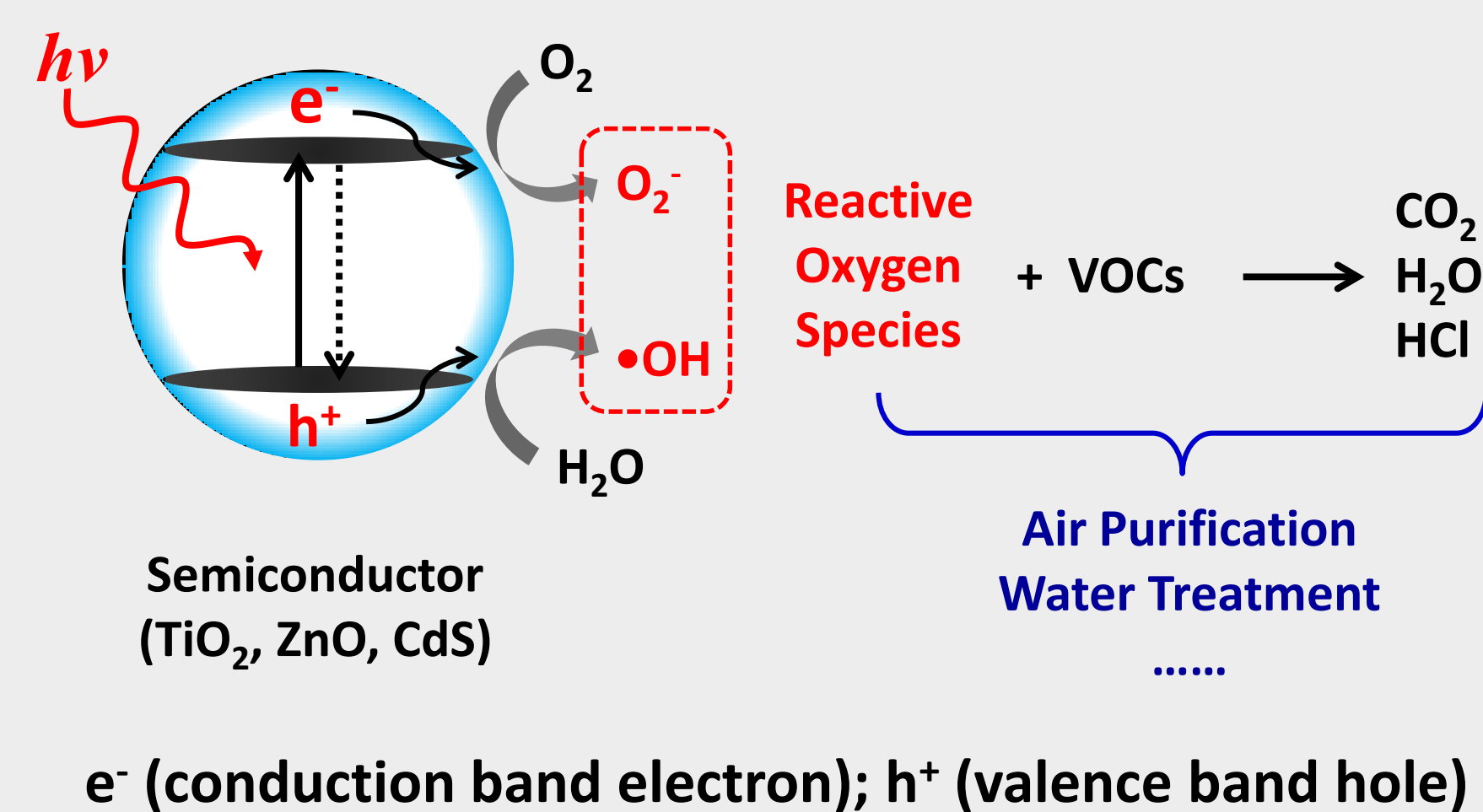


Introduction

- ❑ We face an increasing need for renewable energy sources and clean environment
- ❑ Photocatalysis is a promising approach to harvest solar energy and decompose organic pollutants
- ❑ Titanium Dioxide (TiO_2) is the most extensively studied photocatalyst, but it requires ultraviolet light to function
- ❑ We investigate the effect of morphology on photocatalysis and the use of dopant to improve photoresponse in the visible light region.



Experimental Methods

Hydrothermal Synthesis



Microscopic Imaging



XRD Analysis



Photocatalysis Testing



- ❑ Hydrothermal treatment of titanium nitride (TiN) with acids was performed using different acids, acid concentrations, calcination temperatures, and reaction times.
- ❑ Products were then characterized using various techniques

Experimental Results

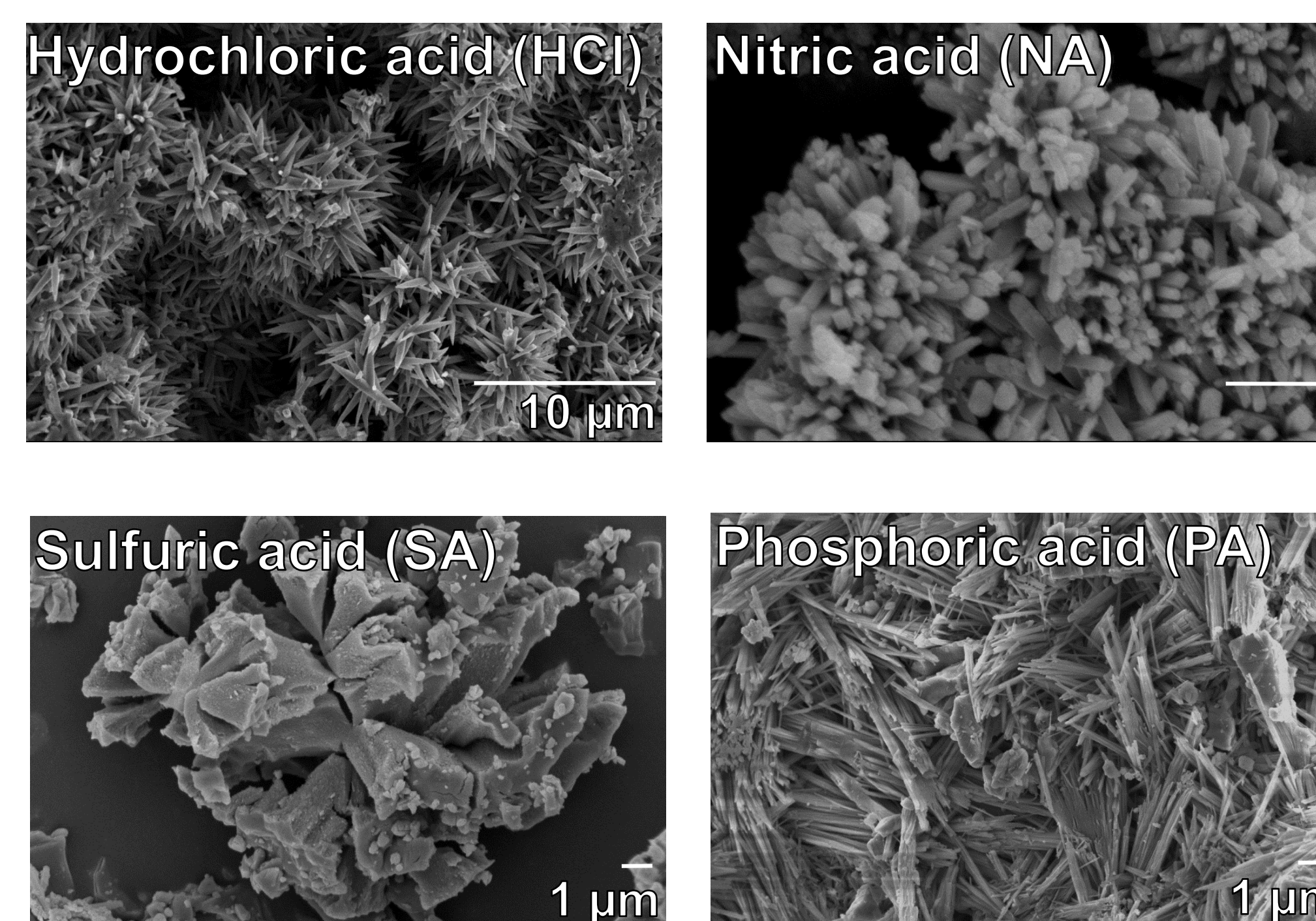


Figure 1. SEM images of TiO_2 synthesized with different acids (concentration 2 M)

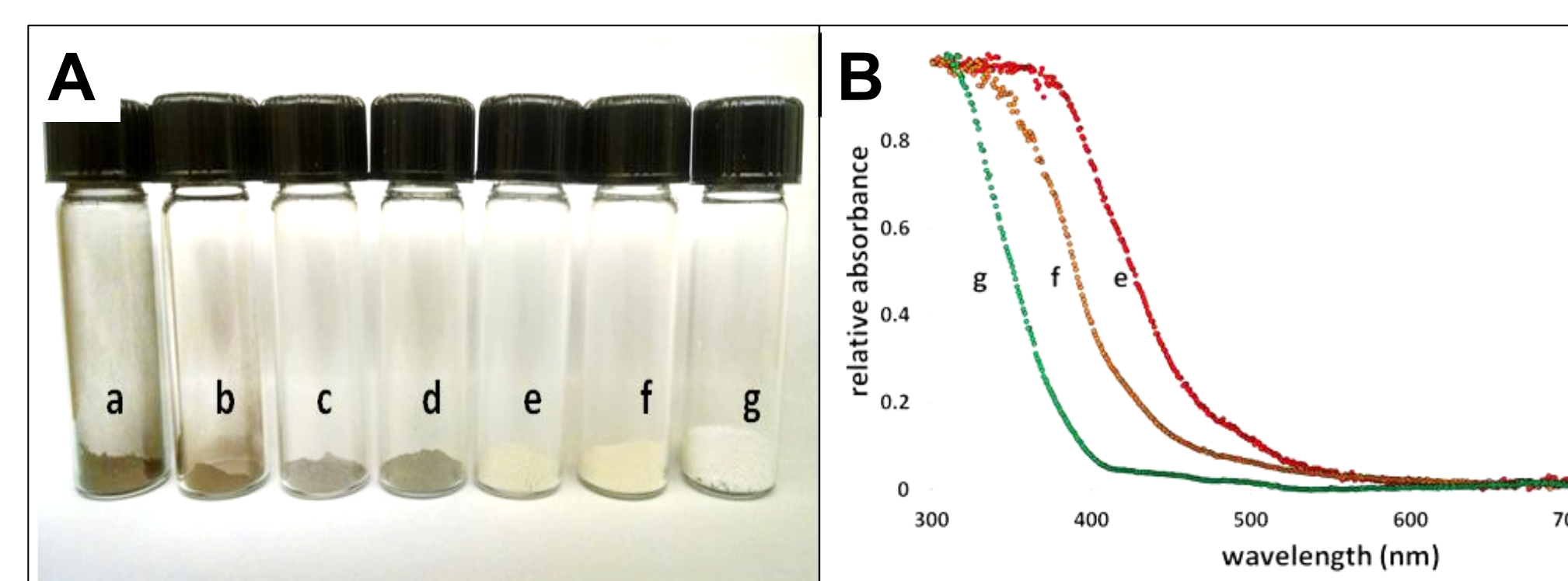


Figure 5. (A) Image showing different powders (a. TiN; b. HCl-2M; c. PA-2M; d. NA-1M; e. NA-2M; f. NA-4M; g. P25- TiO_2). (B) UV-visible spectra of selected samples

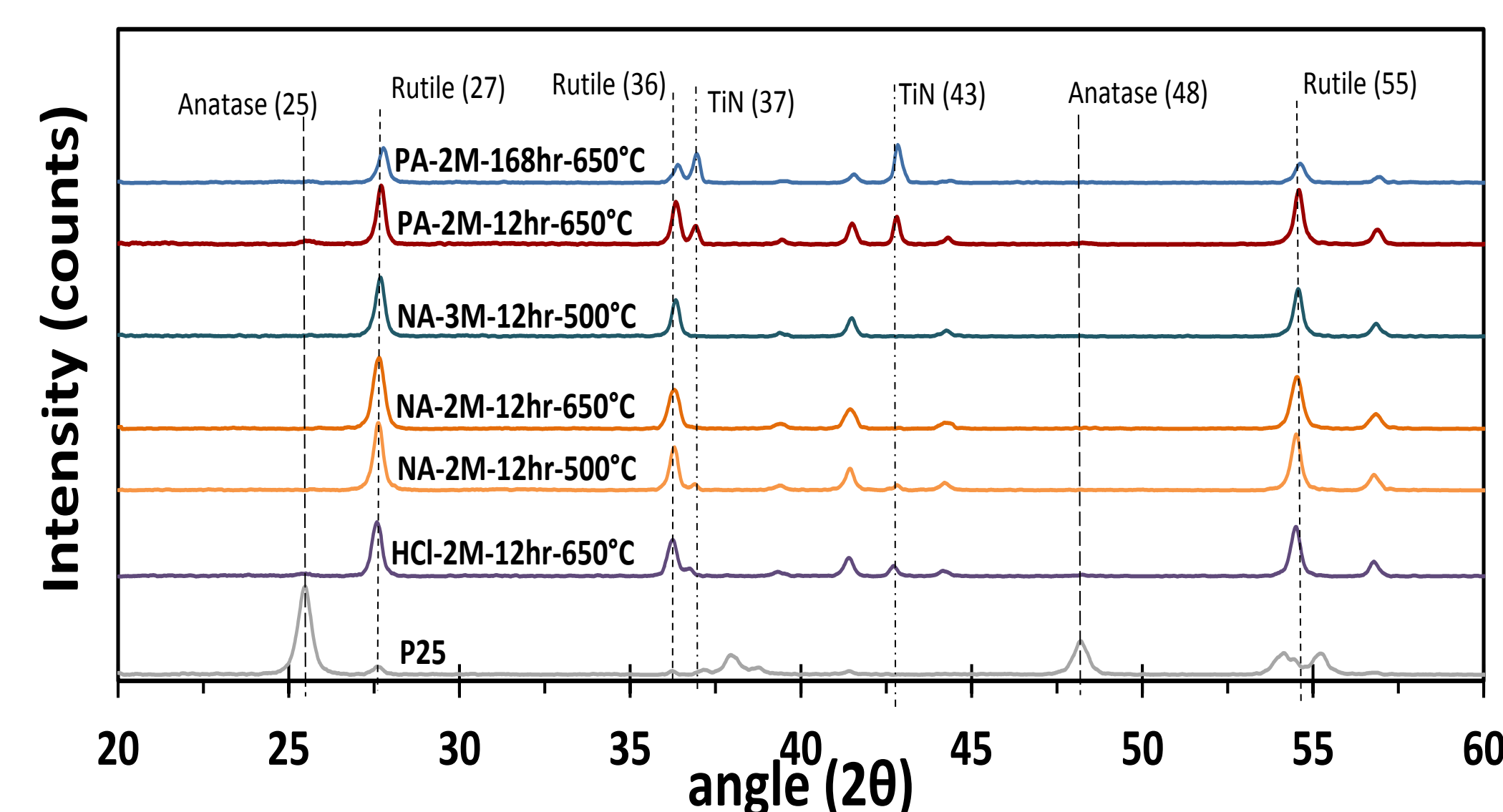


Figure 6. X-ray diffraction patterns of different TiO_2

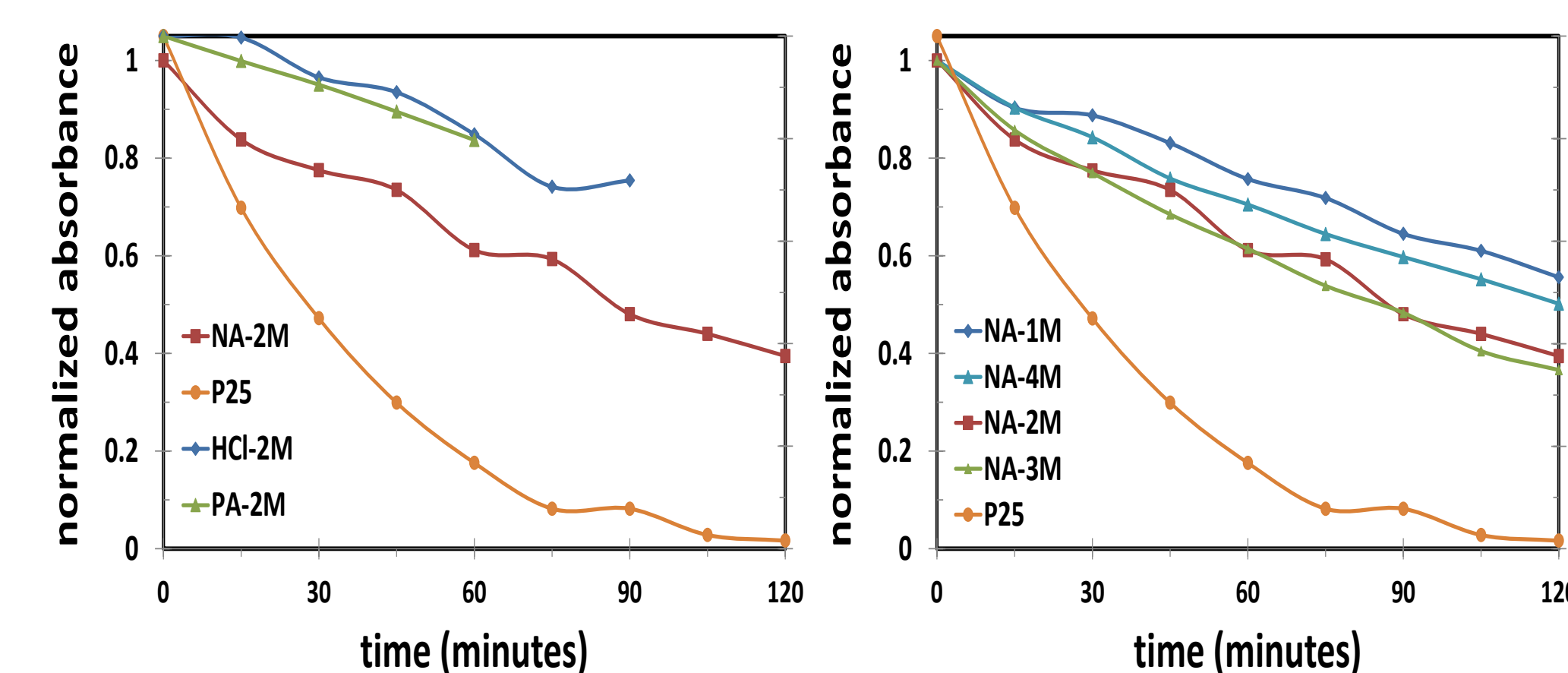


Figure 7. Visible light photocatalytic degradation of a dye molecule (methylene blue) using different TiO_2 materials

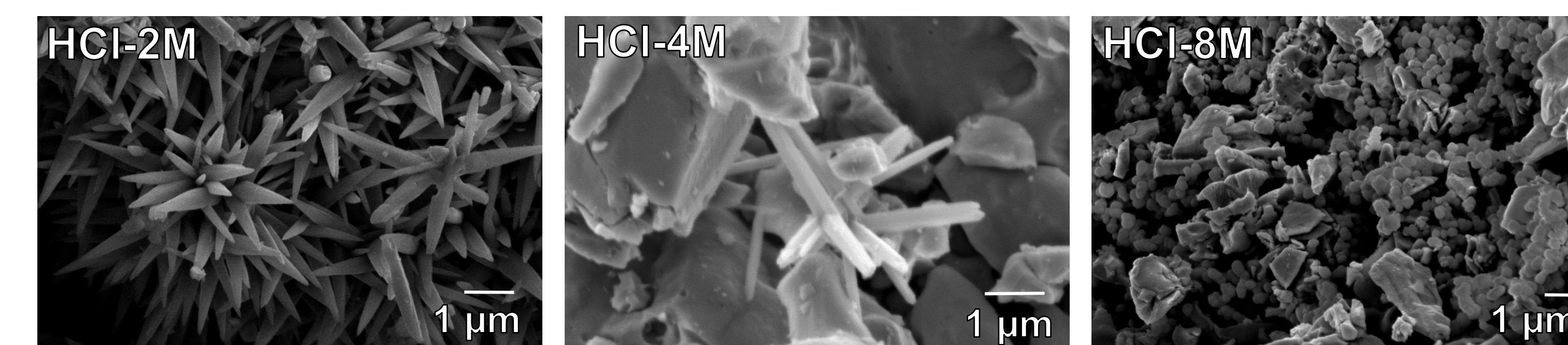


Figure 2. SEM images of TiO_2 synthesized using HCl at different concentrations

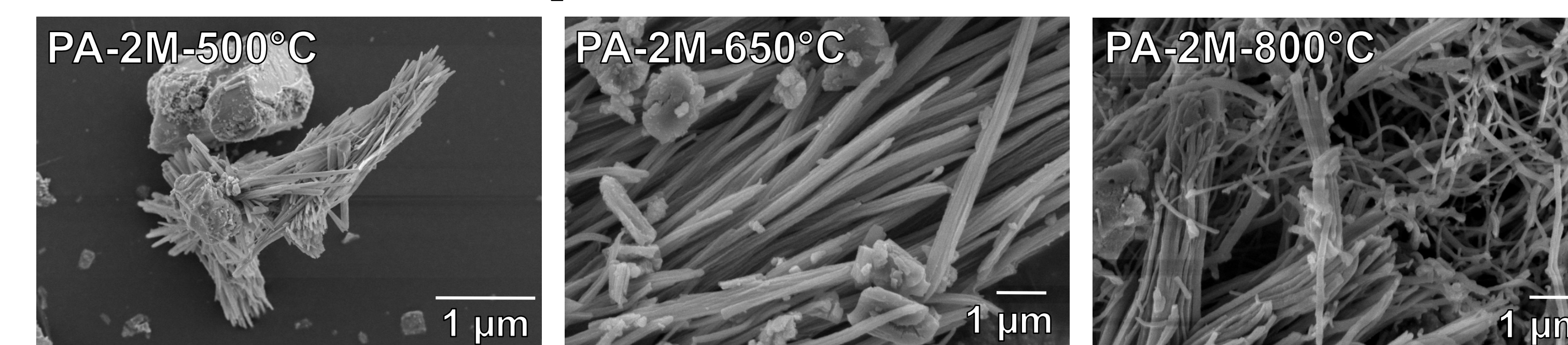


Figure 3. SEM images of TiO_2 after calcination at different temperatures

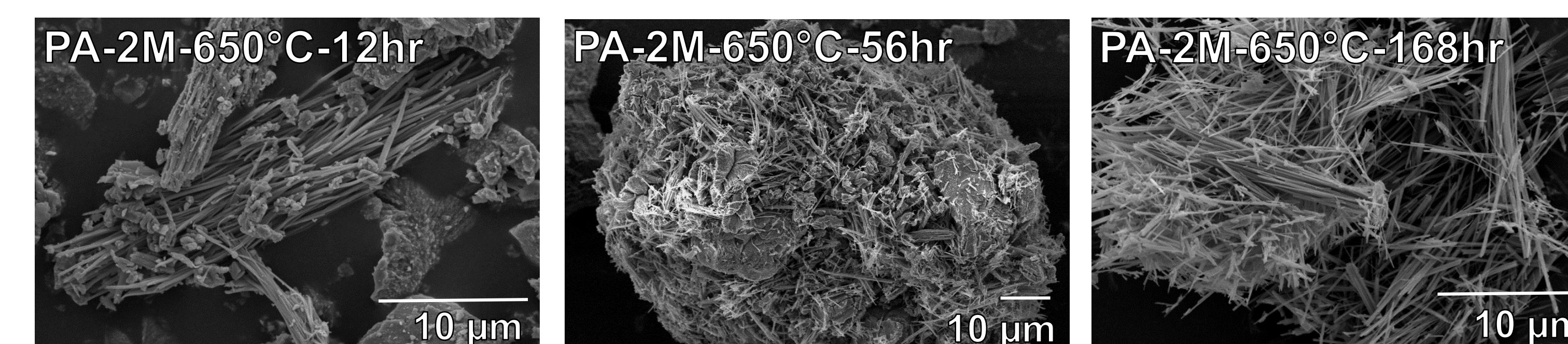


Figure 4. SEM images of TiO_2 synthesized with varying reaction times

Conclusions

- ❑ Higher acid concentrations inhibited formation of rods;
- ❑ Higher calcination temperatures led to thinner rods;
- ❑ Longer hydrothermal treatment times promoted formation of rods;
- ❑ TiO_2 prepared using nitric acid showed the best activity in visible light dye degradation, while maintaining a robust morphology at different acid concentrations;
- ❑ The use of phosphoric and hydrochloric acid resulted in unique morphology but the resulting TiO_2 materials were not efficient in visible light photocatalysis.

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