Cathodic Deposition of TiO_2 and ZnO with Supercritical CO_2 Emulsified Electrolyte

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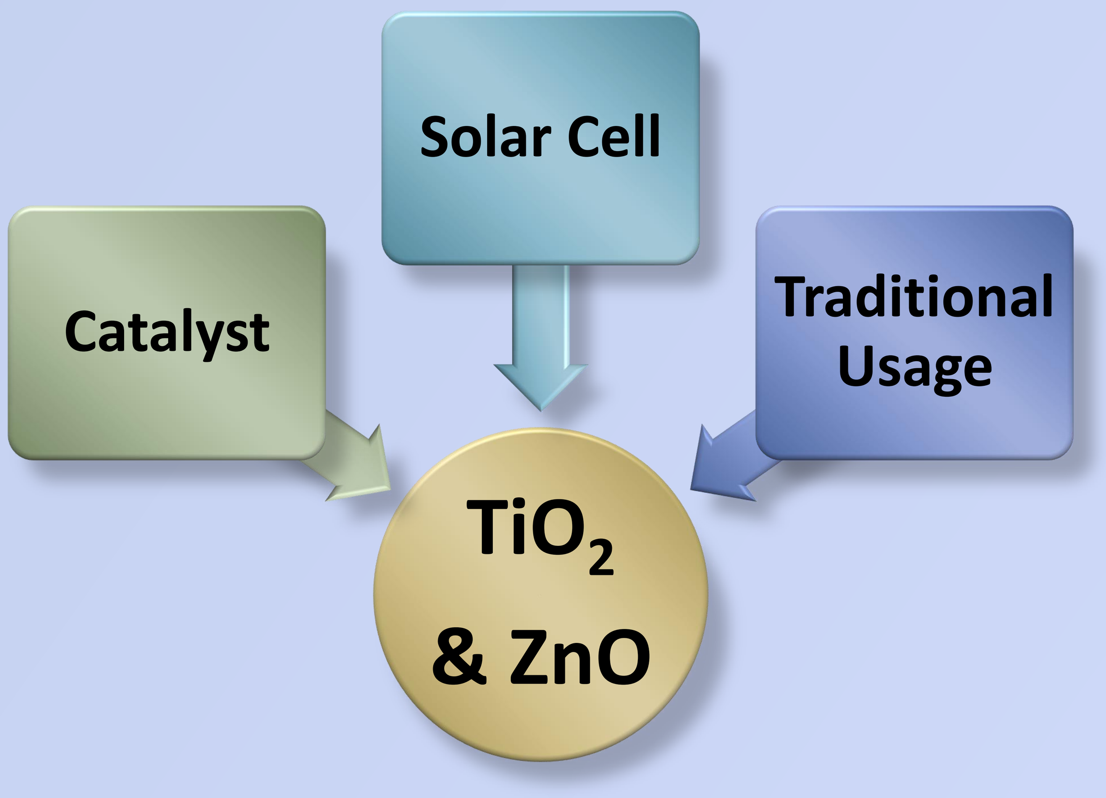
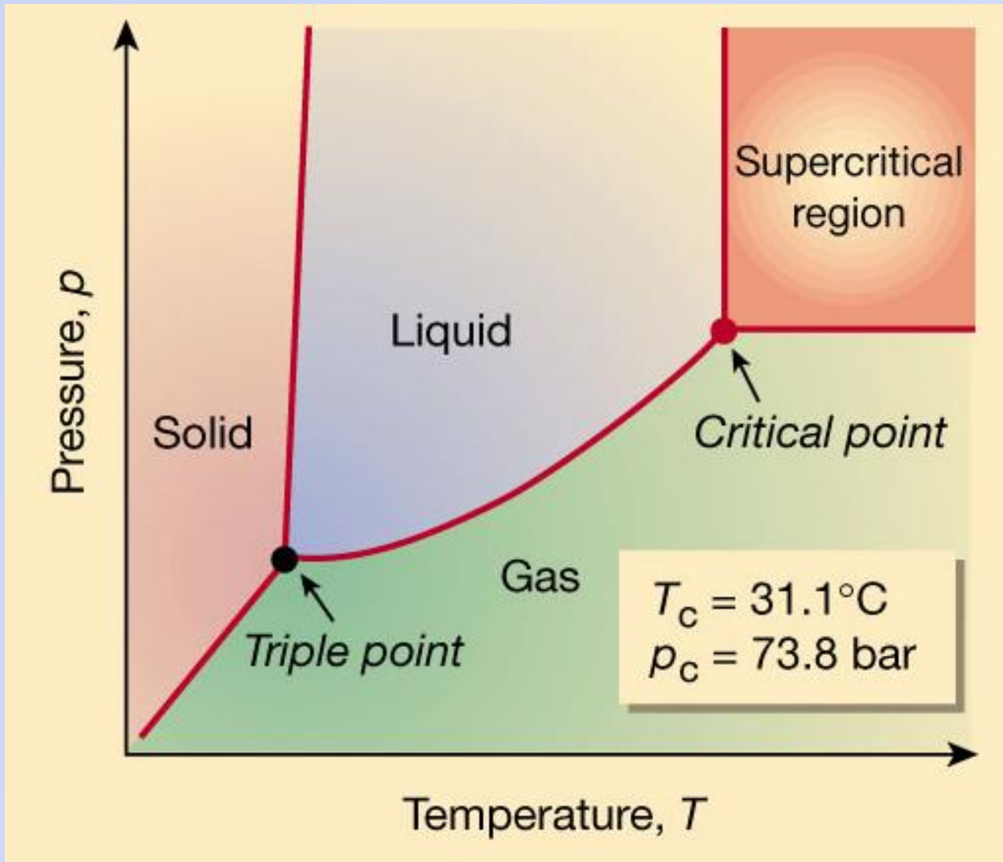
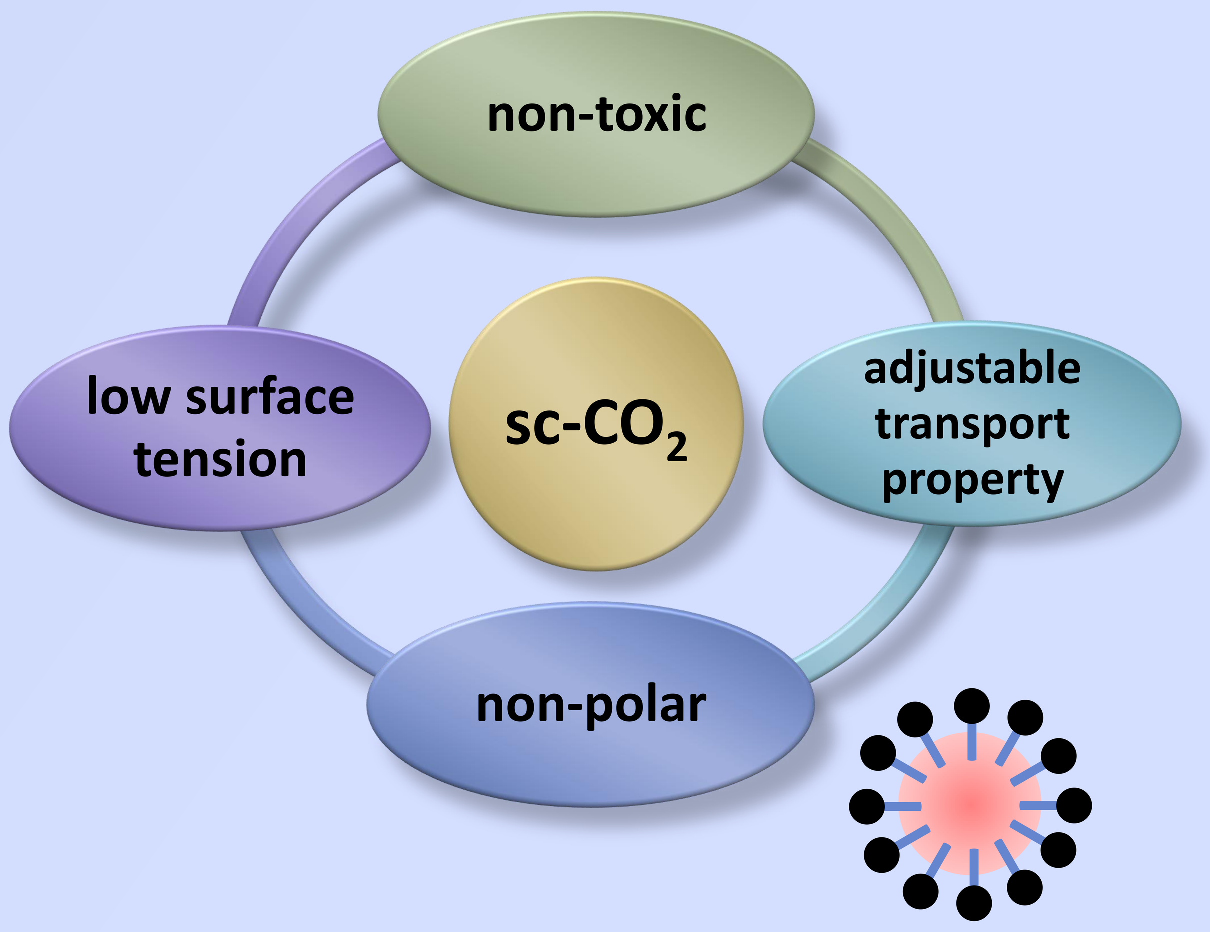


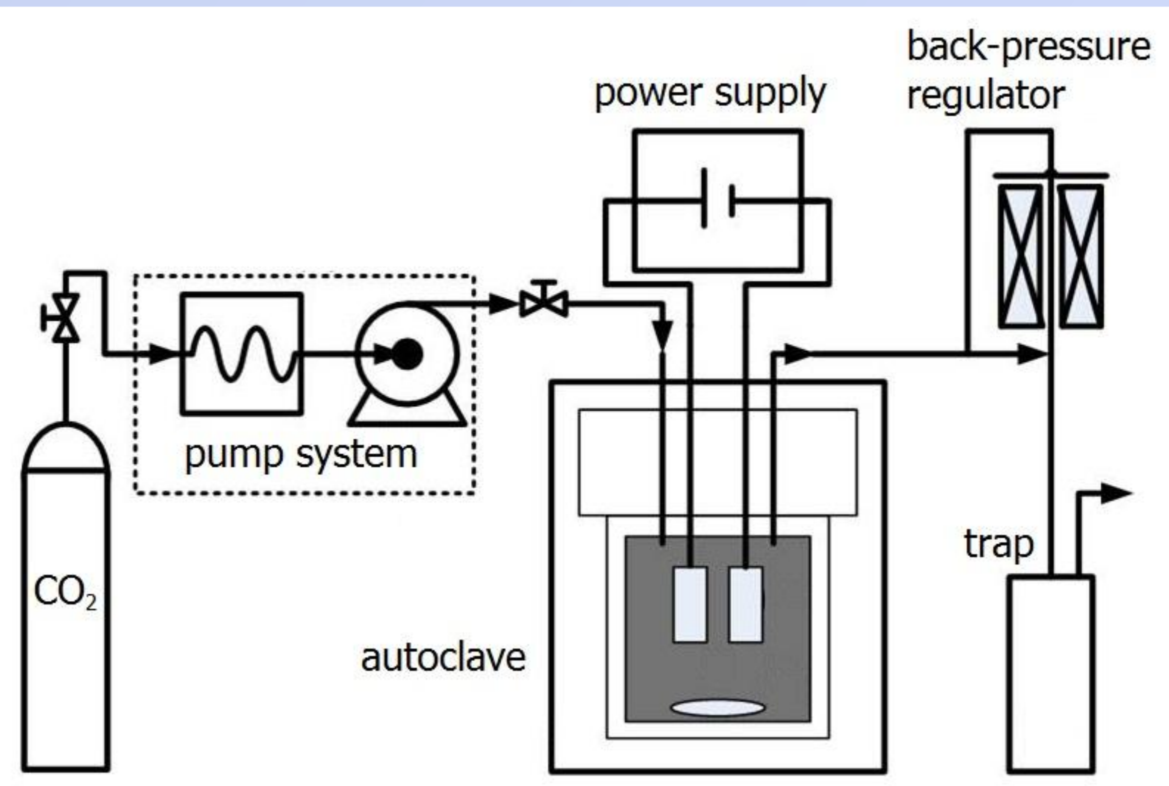


[1] W. Leitner, *Nature* 2000. *405*, 129-130.



add surfactant to form sc-CO_2 emulsion

Experimental Section



Results and Discussion

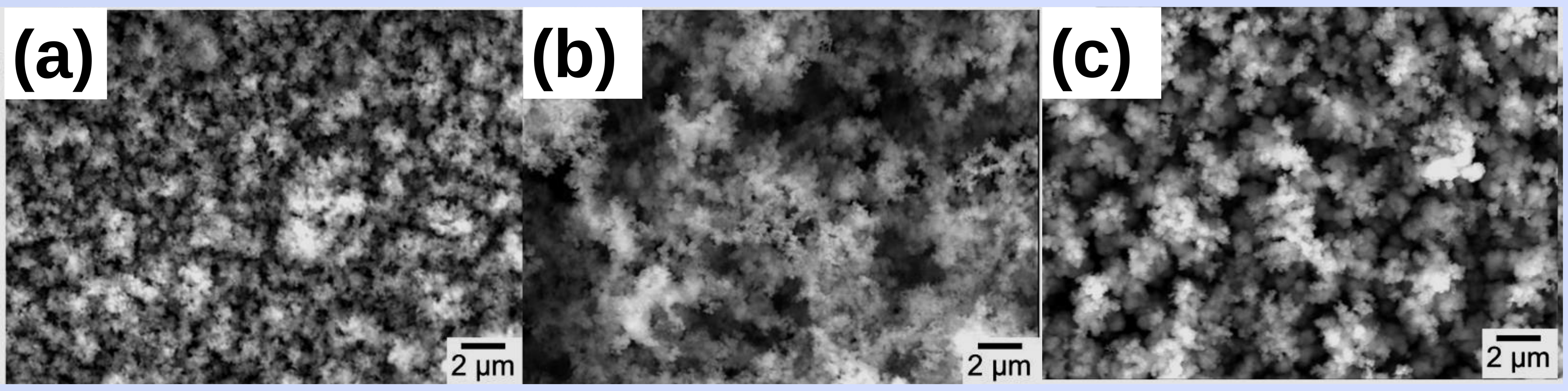


Figure 1. SEM image of TiO_2 structures prepared by (a) conventional process (b) deposition with surfactants (c) deposition with sc-CO_2 emulsion.

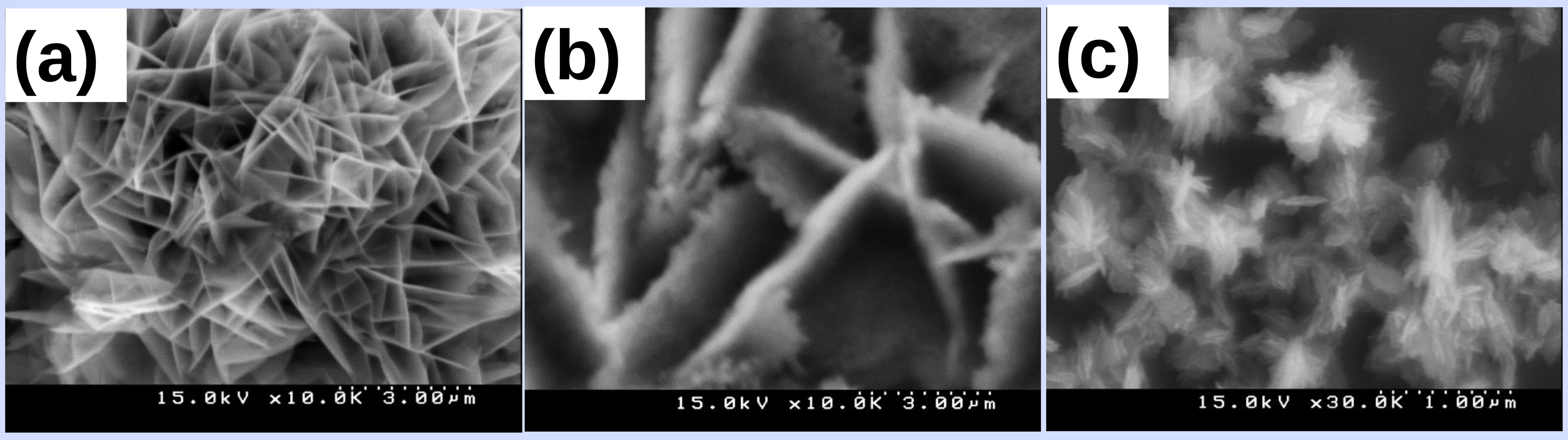


Figure 2. SEM image of ZnO structures prepared by (a) conventional process (b) deposition with surfactants (c) deposition with sc-CO_2 emulsion.

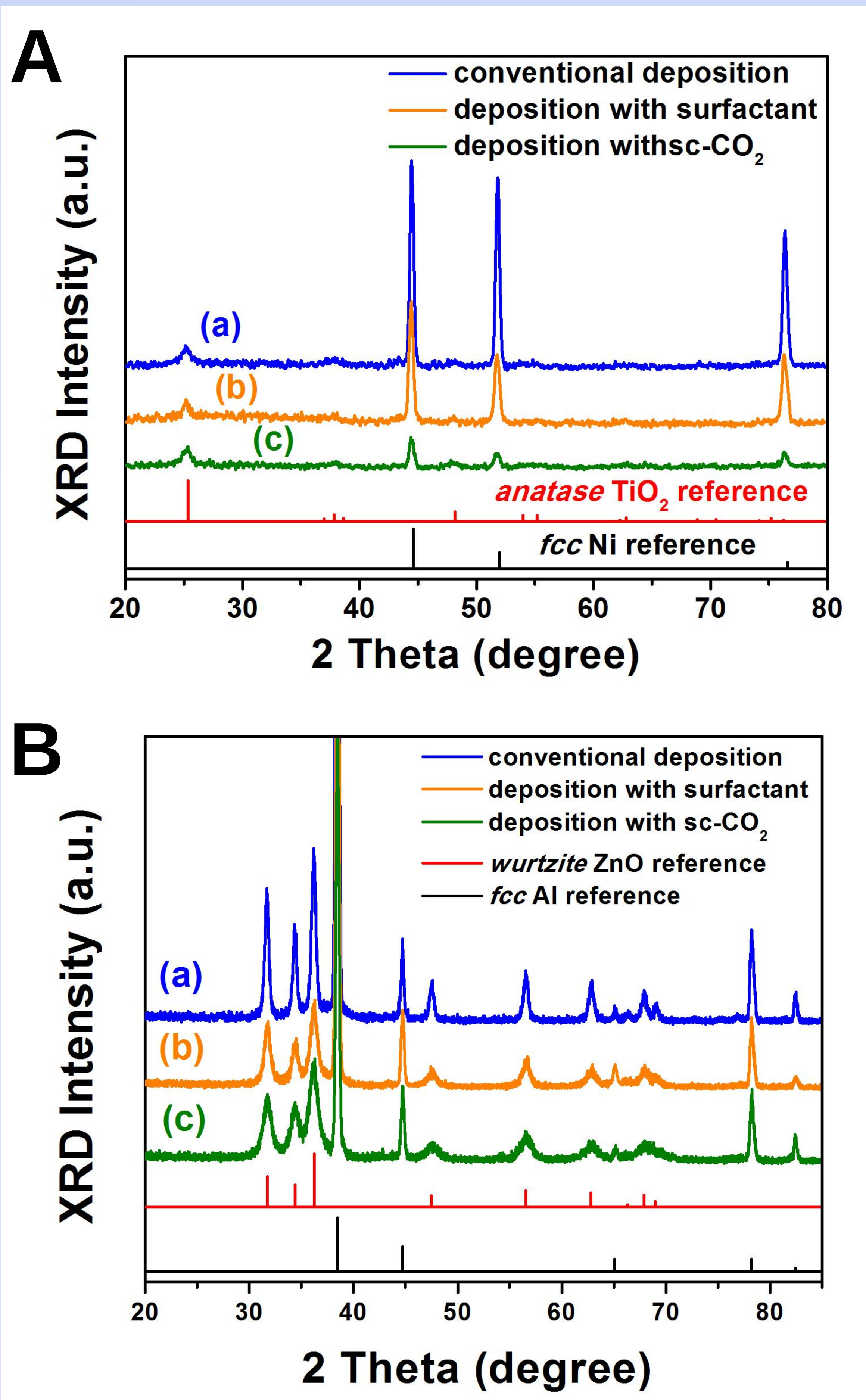


Figure 3. Corresponding XRD patterns of (A) TiO_2 and (B) ZnO structures prepared by (a) conventional deposition(b) deposition with surfactants (c) deposition with sc-CO_2 emulsion.

Conclusion

- In this work, the successful demonstration for sc-CO_2 emulsion-assisted galvanostatic cathodic deposition process of TiO_2 and ZnO structures in supercritical fluid condition was proposed.
- The transport efficiency for NO_3^- could be improved with the introduction of sc-CO_2, which facilitate the transportation of reactants into and out the reaction sites to generate abundant amounts of OH^-.
- Grain size of the TiO_2 structures increased after addition of the surfactant and further increased after emulsifying the electrolyte with sc-CO_2, which came from the faster transfer of materials into and out of the diffusion layer .
- The two-dimension platelet ZnO structure were the result of selective adsorption of Cl^- on the (0001) surface of ZnO, and the improving transport property resulted the smaller size of ZnO structures.

Acknowledgement

This work was supported by the Cabinet Office (CAO) in Japan with Next Generation World-leading Researchers Program GN037 and the National Science Council (NSC) of the Republic of China under Grant No. NSC-98-2113-M-009-015-MY2 .