

***Spherical meso-silica particles
made of silicalite-1 precursors***

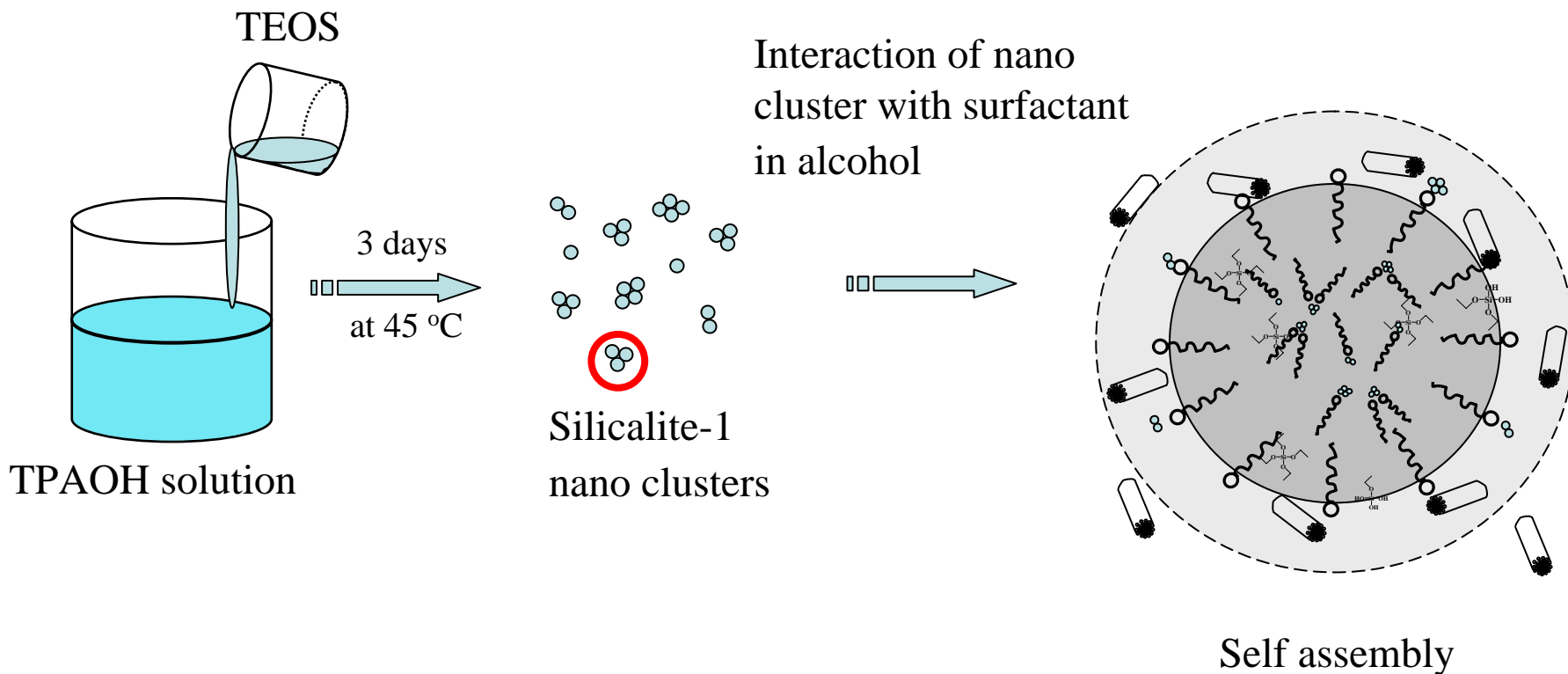
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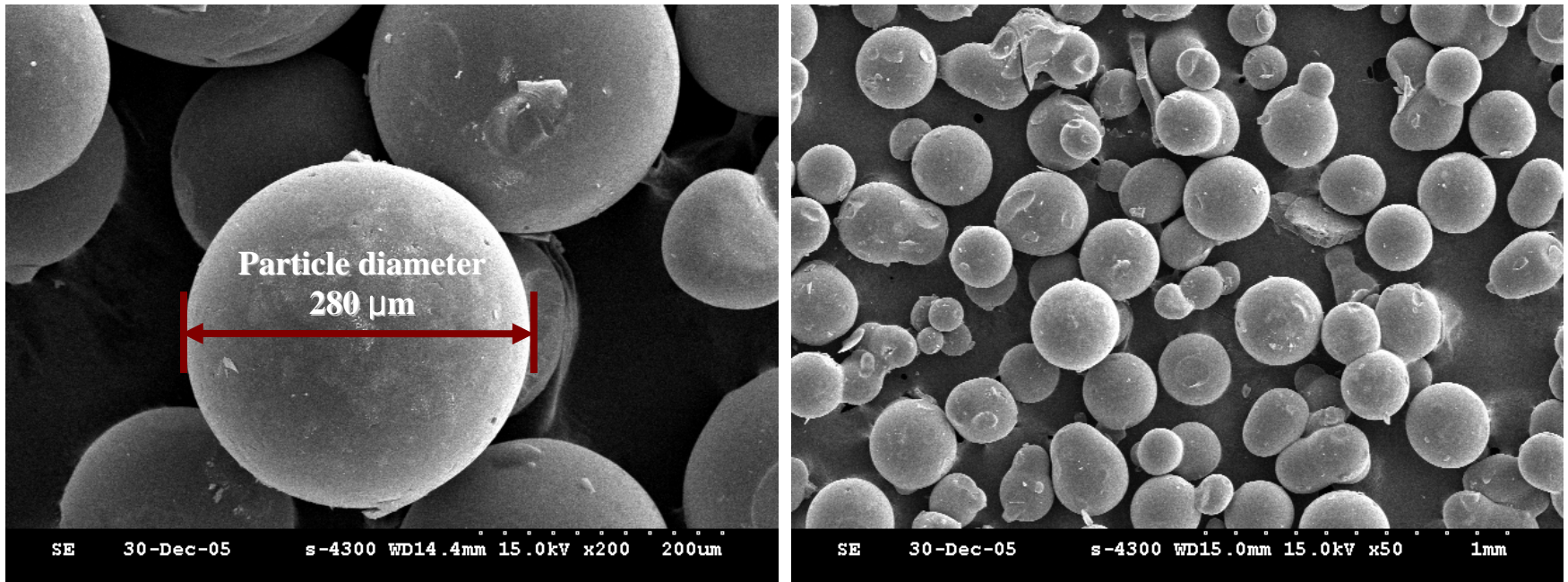
INTRODUCTION

- Previously, spherical mesosilica particles were successfully made in an emulsion system.
- But their hydrothermal stability was weak for industrial application.
- So, spherical mesoporous silica particles, which have enhanced hydrothermal stability and hardness, were prepared by employing nano-silicalite-1 precursors.

Low temp synthesis of nano-silicalite-1 precursors



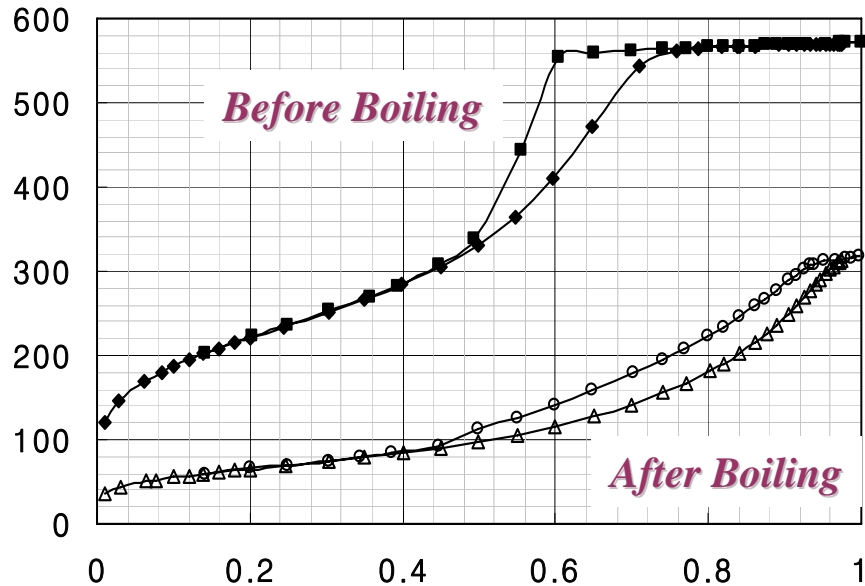
Particle Morphology & Size



– Particle size was 200 – 1000 μm depending on the amount of alcohol and stirring speed.

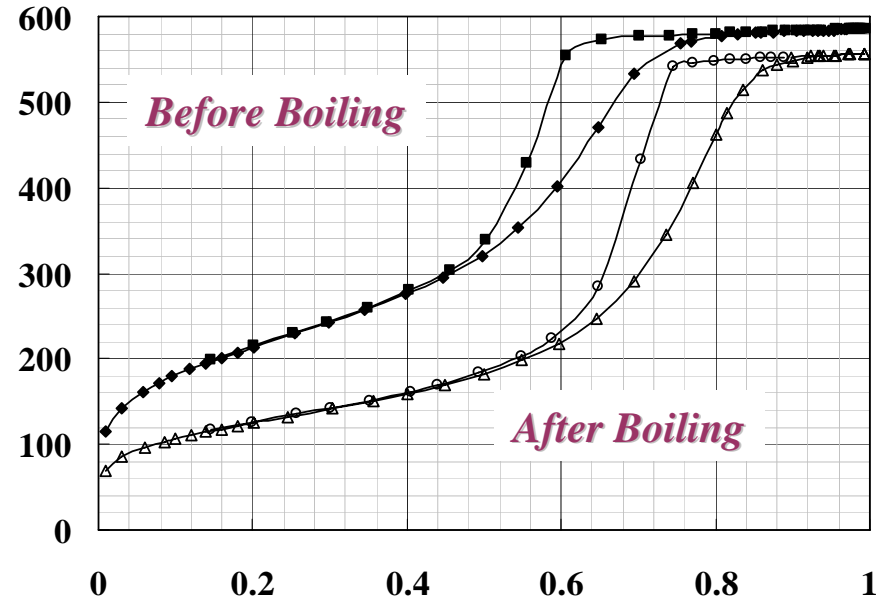
Hydrothermal Stability

✓ Using TEOS



BET Surface Area : 802 → 236 m²/g
Pore Volume : 0.88 → 0.49 cc/g
Pore Diameter : 4.9 nm → very broad

✓ Using silicalite-1 clusters



BET Surface Area : 777 → 452 m²/g
Pore Volume : 0.91 → 0.86 cc/g
Pore Diameter : 4.8 → 6.1 nm

CONCLUSIONS

- Spherical mesoporous silica particles prepared by nano-silicalite-1 precursors demonstrated enhanced hardness and hydrothermal stability.
- In boiling test, surface area decreased from 777 to 452 m²/g, but pore volume and pore structure were mostly maintained.
- After boiling test, morphology of materials prepared using nano-silicalite-1 precursors was spherical, whilst that of materials prepared using TEOS precursor was fine powders.