



Synthesis of polystyrene nanoparticles with controlled size *via* emulsion polymerization



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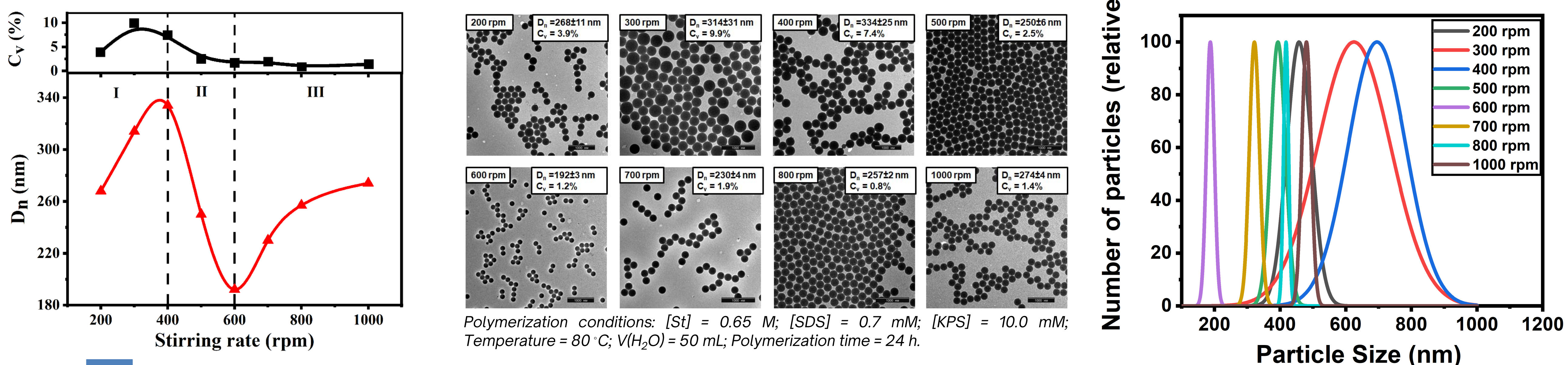
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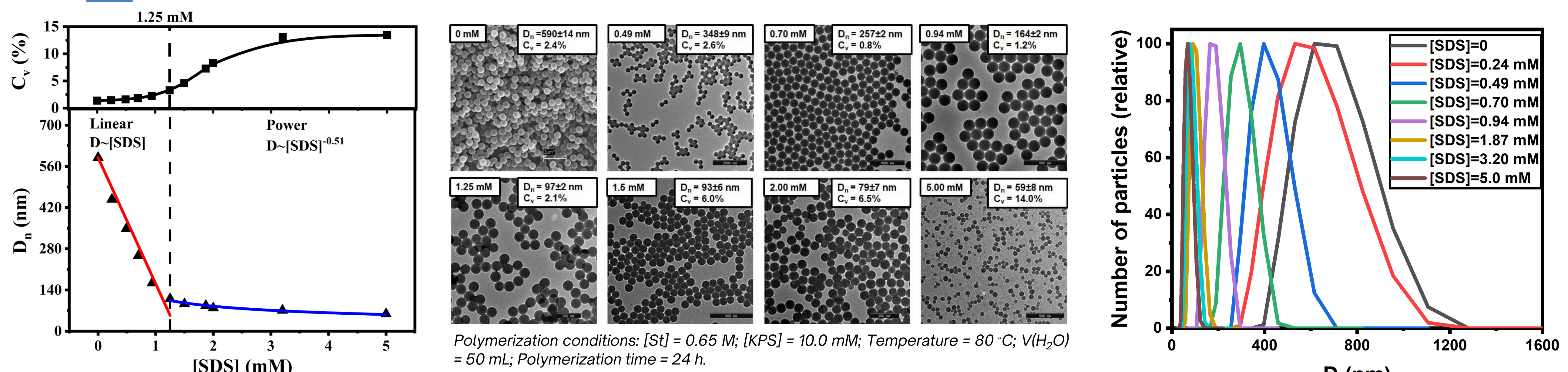
1 Introduction

The synthesis of monodisperse polystyrene nanoparticles has attracted significant attention due to their extensive applications in diverse fields. The emulsion polymerization process is mainly used to produce polymer nanoparticles. Despite the numerous studies on emulsion polymerization, the focus on particle size control has been limited. Moreover, most studies do not fully disclose hydrodynamic conditions, making it difficult to compare results among different research groups.

2 Influence of Stirring rate



3 Influence of SDS concentration



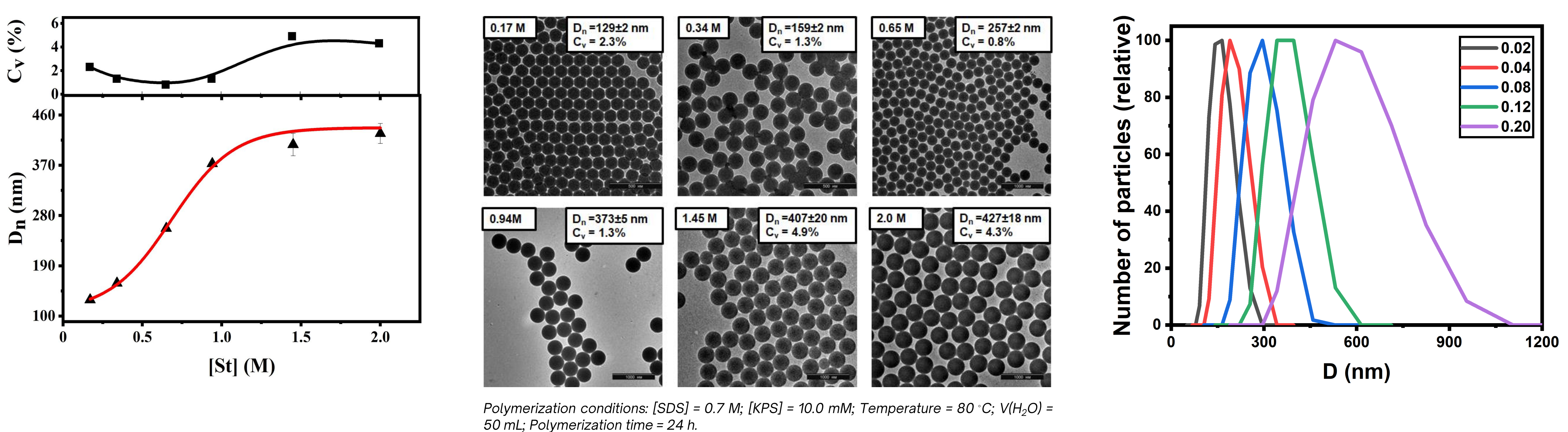
➤ Linear dependence at $[SDS] < 1.25$ mM

➤ Broadening of particle size distribution at $[SDS] > 1.25$ mM

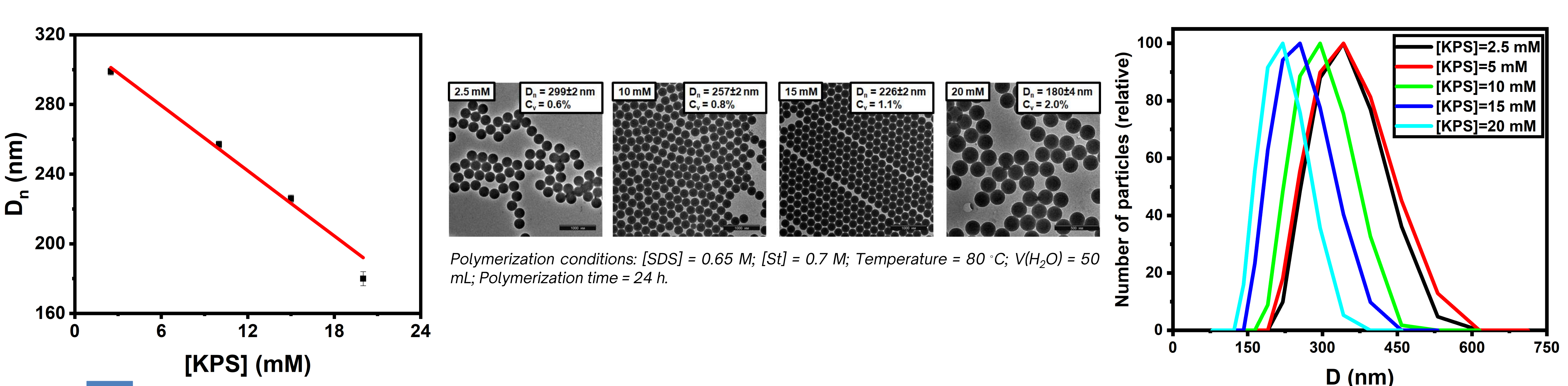
➤ Monodisperse particles with $C_v \leq 2.6\%$ at $[SDS] < 1.25$ mM

➤ $D_n \sim [SDS]^{-0.51}$ at $[SDS] > 1.25$ mM

4 Influence of Styrene concentration



5 Influence of KPS concentration



6 Conclusion

- The optimal stirring rate for the preparation of monodisperse polystyrene particles via emulsion polymerization is 800 rpm.
- Surfactant and monomer concentrations have been shown to be effective tools for regulating particle diameter without the loss of monodispersity.
- The precise control of particle diameter can be achieved by varying the initiator concentration.
- Monodisperse particles ($C_v \leq 2.6\%$) with diameters ranging from 110 to 590 nm were obtained.

Acknowledgments

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