Quantitative measurement of nanoconfinement effects on molecular transport and chemical reaction

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Gold statement

- Measure the single molecular diffusion in nanopores
- Understand nanoconfinement effects in separation
- Discover the effects of chemical environments in nanoconfining materials

Introduction

Theoretical studies with simplified model systems and ensemble experimental measurements have shown that molecular transport and chemical reactions in nanoconfined environments are largely different compared to those in bulk solution.

Body

We design a well-defined platform with catalytic reaction centers confined in the end of nanopores with controlled lengths to study the in situ dynamic behavior of mass transport and catalytic processes under nanoconfinement at the single-molecule and single-particle level. Variable single molecular mass transport behavior reveals the heterogeneity of the confined environment in the nanopores.

Conclusion

The combination of the unique model nanomaterial and the single-molecule super-localization imaging technique paves the way to understand the fundamental nanoconfinement effects for catalysis and analytical separations. The measurement of diffusion coefficient at the single-molecule level under operando conditions reveals the heterogeneity of the confined environment in the nanopores with variable single molecular mass transport behavior.

References

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