Generating Nanoparticles from Tellurium, Bismuth, Gallium, Gold, Iron and Various Salts Using the Silver Particle Generator (SPG)

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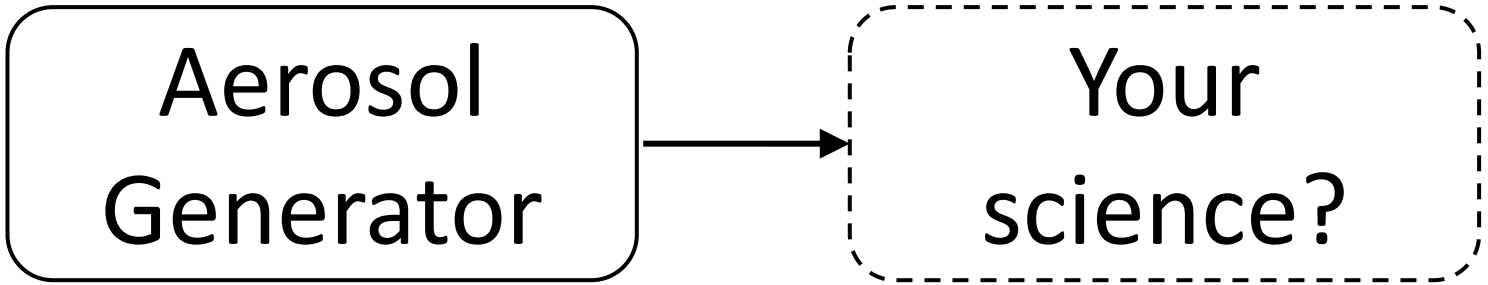
APT, Corfu, 11 May 2026

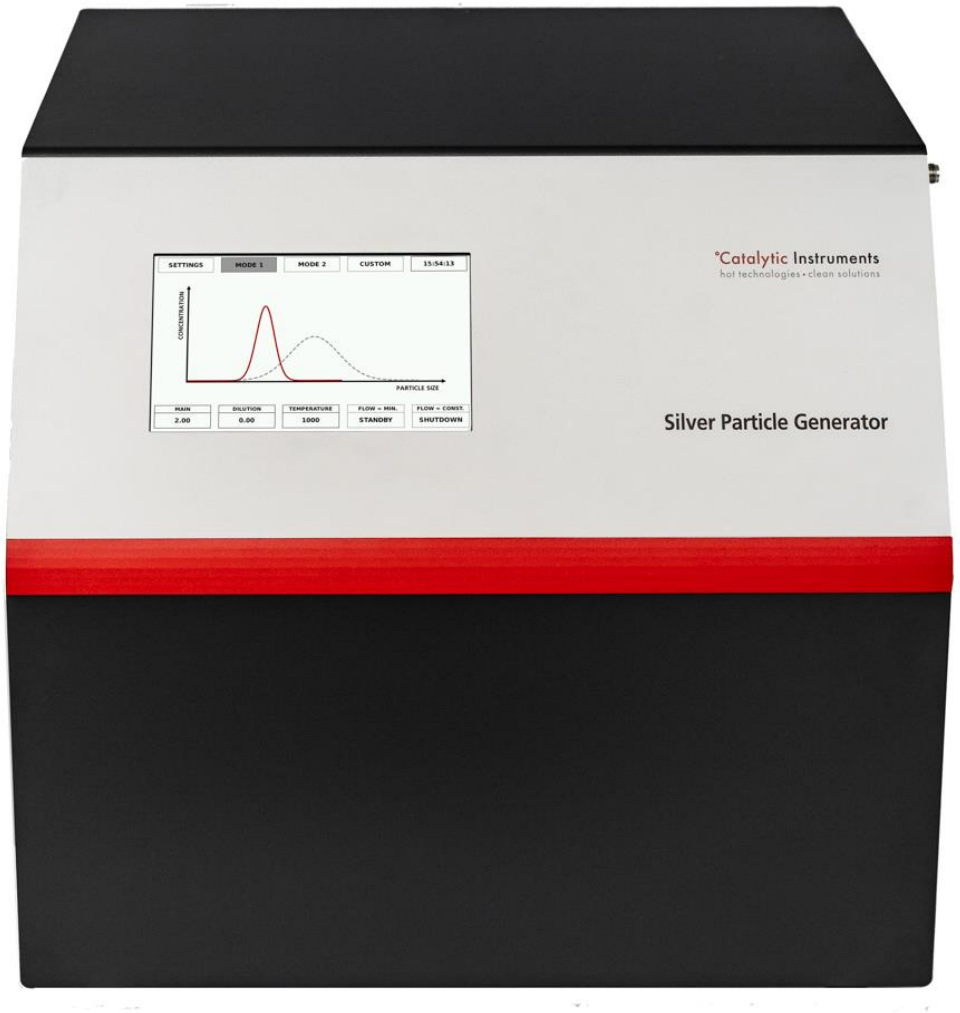
Aerosol Generation

- Start of many lab studies in aerosol science:



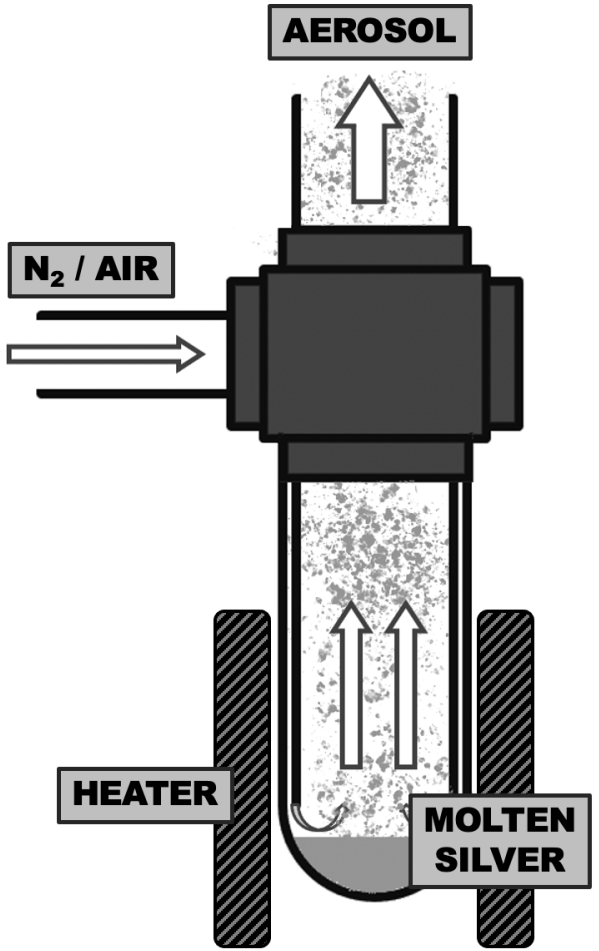
- Evaporation-condensation method
  - Scheibel and Porstendörfer (1983). (Salt (NaCl) and Silver)
  - versatile and reliable technique
  - Different materials possible: Metals, Salts, Plastics (Wlasits *et al.*, 2022)
- Each lab has a different setup → difficult to compare
- Tube furnaces cumbersome to operate, slow temperature changes

Silver Particle Generator (SPG)



- Standardize and simplify the evaporation-condensation generation method
- Precise, fast and easy control of temperature and flow
- Stable and high repeatability
- Different materials are possible
- Simple exchange of tube set

SPG Tube Set

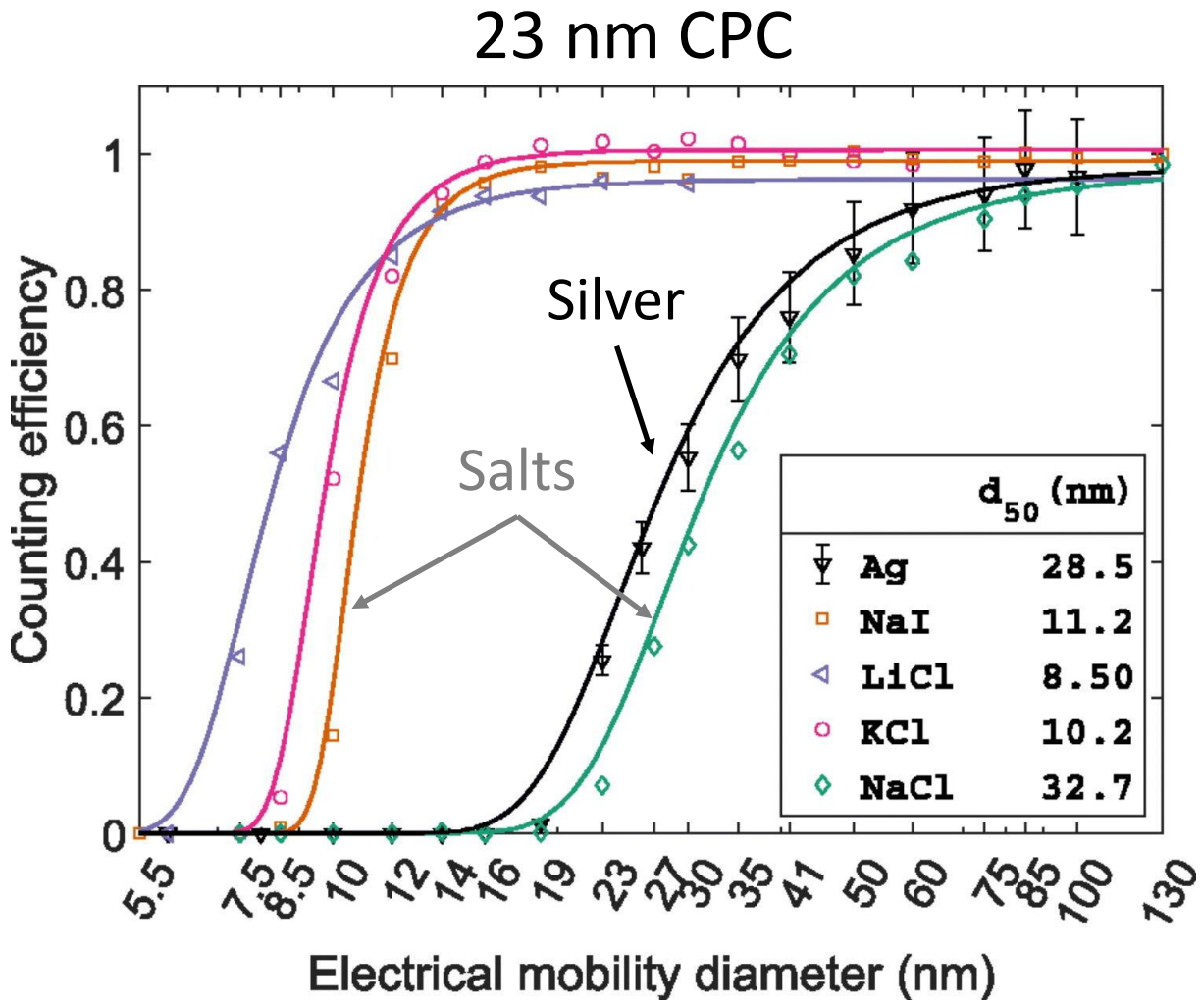


- Ceramic (Alumina) Tubes
- Cleaned by baking
- 1 Tube set for each material

CPC Counting Efficiency for Different Materials

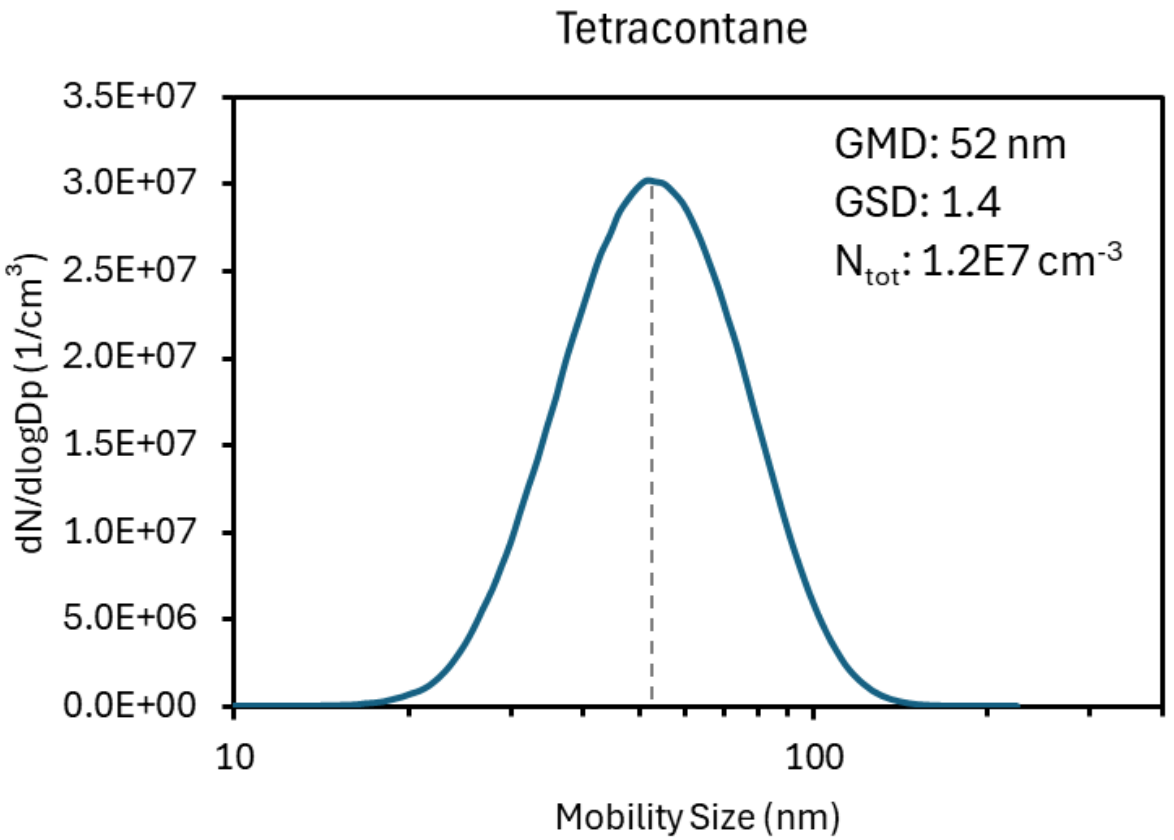
- The material of seed particles influence condensation behavior

- Example:
  Condensation Particle Counter (CPC)
  Counting efficiency
  - Krasa, H., Risby, K.M., Kupper, M., Bergmann, A., and Boies, A.M. (2025). *Aerosol Science and Technology* 59 (9):1151



Krasa *et al.* (2025). *Aerosol Science and Technology* 59 (9):1151

Low Temperature Materials (up to 300 °C)

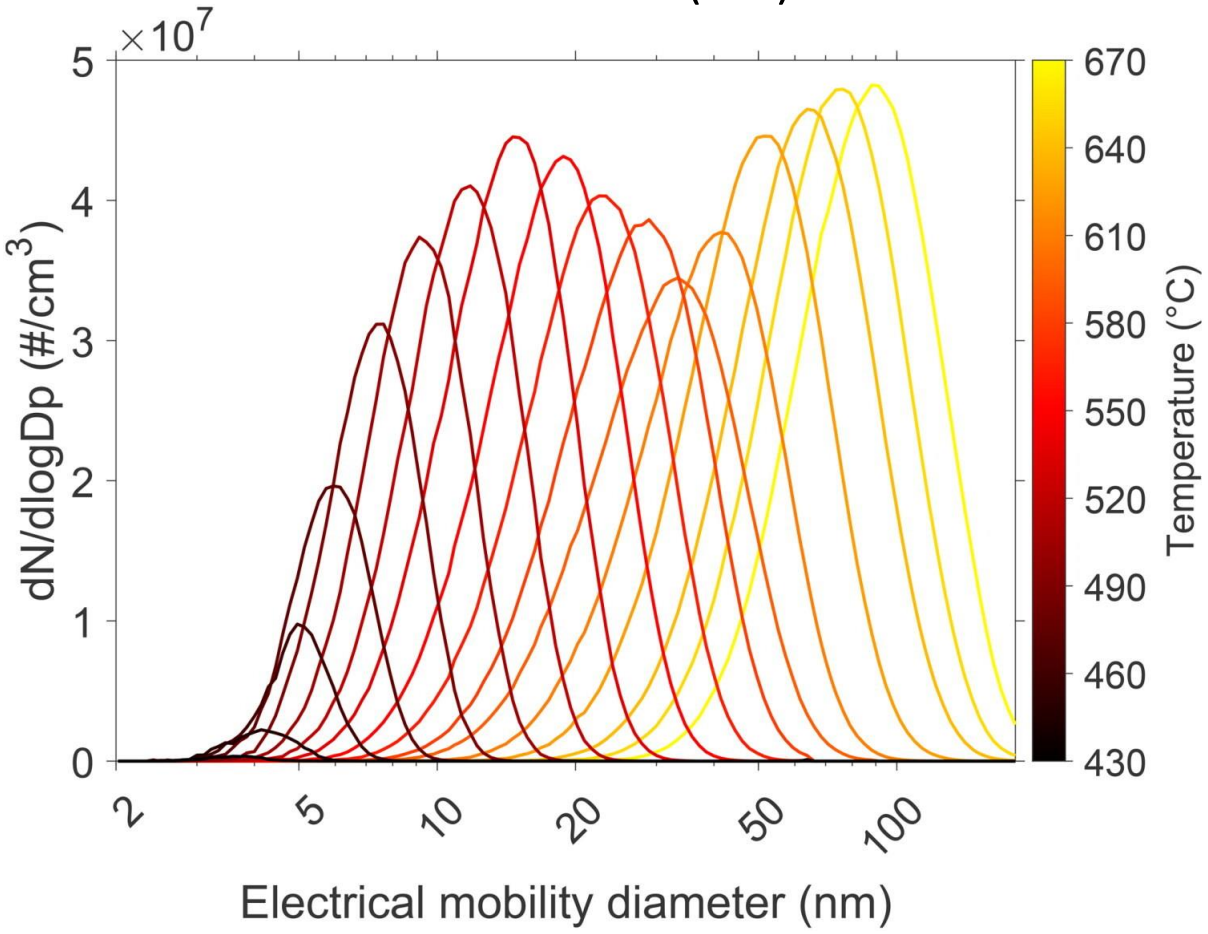


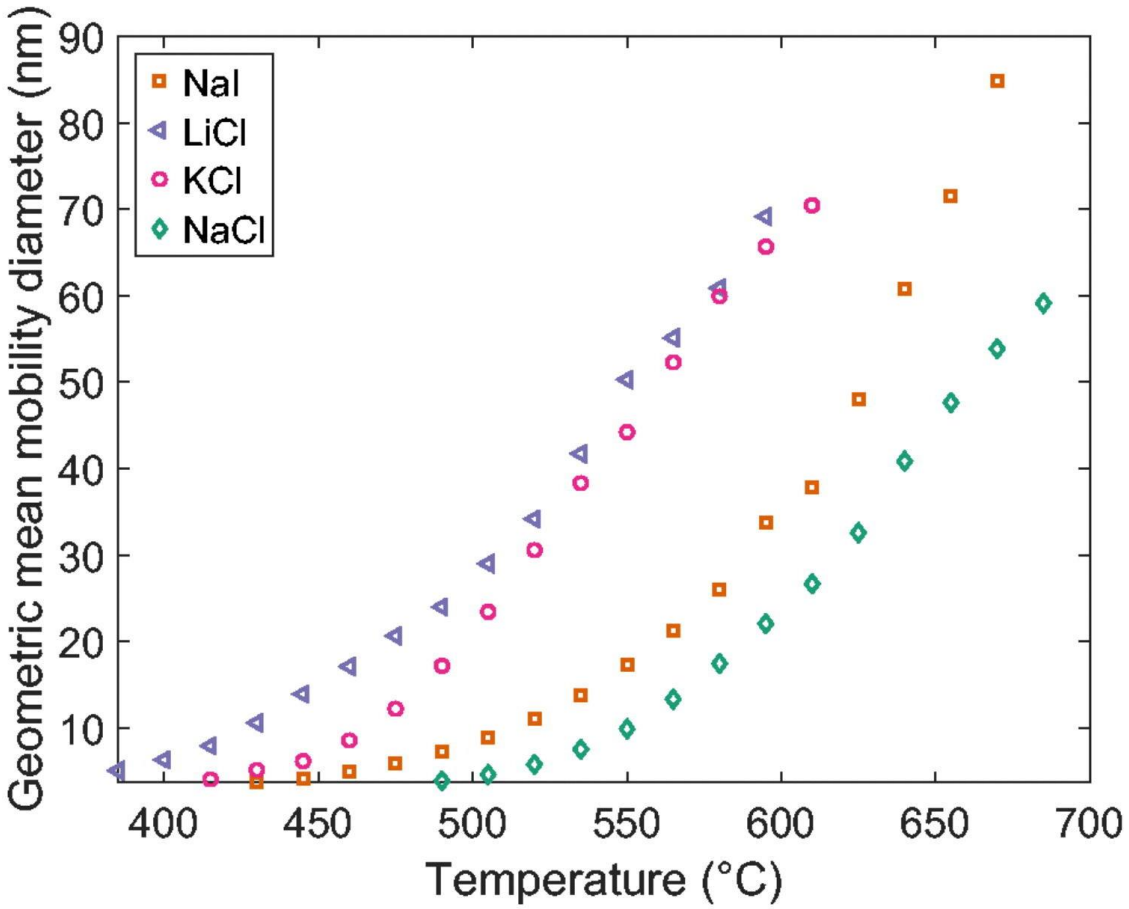
- Tetracontane ($C_{40}H_{82}$)
  - PMP Volatile Particle Remover Testing
  - Testing our own Catalytic Strippers (CS)

- Plastics
  (similar as Wlasits *et al.*, 2022)

Medium Temperature Salts (300 – 900 °C)

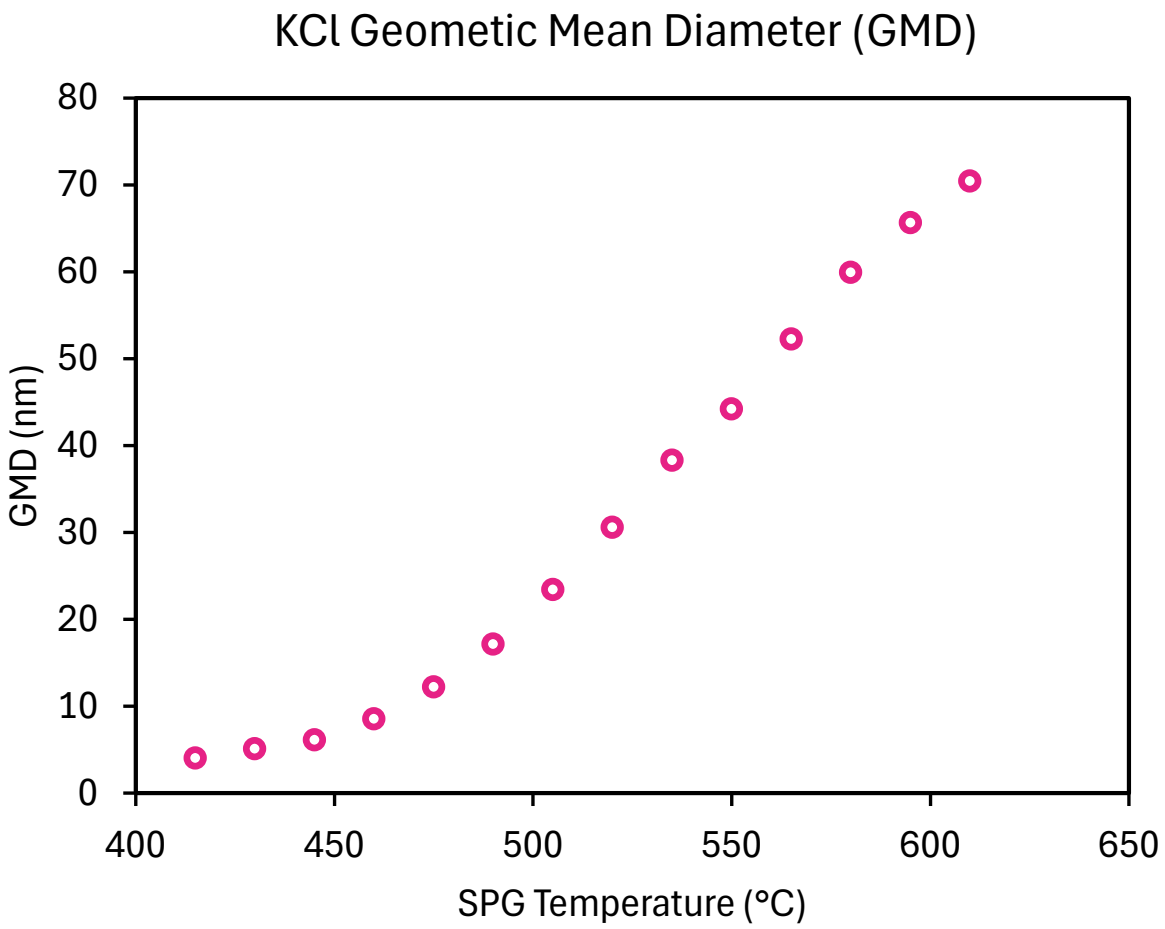
Sodium iodide (NaI)

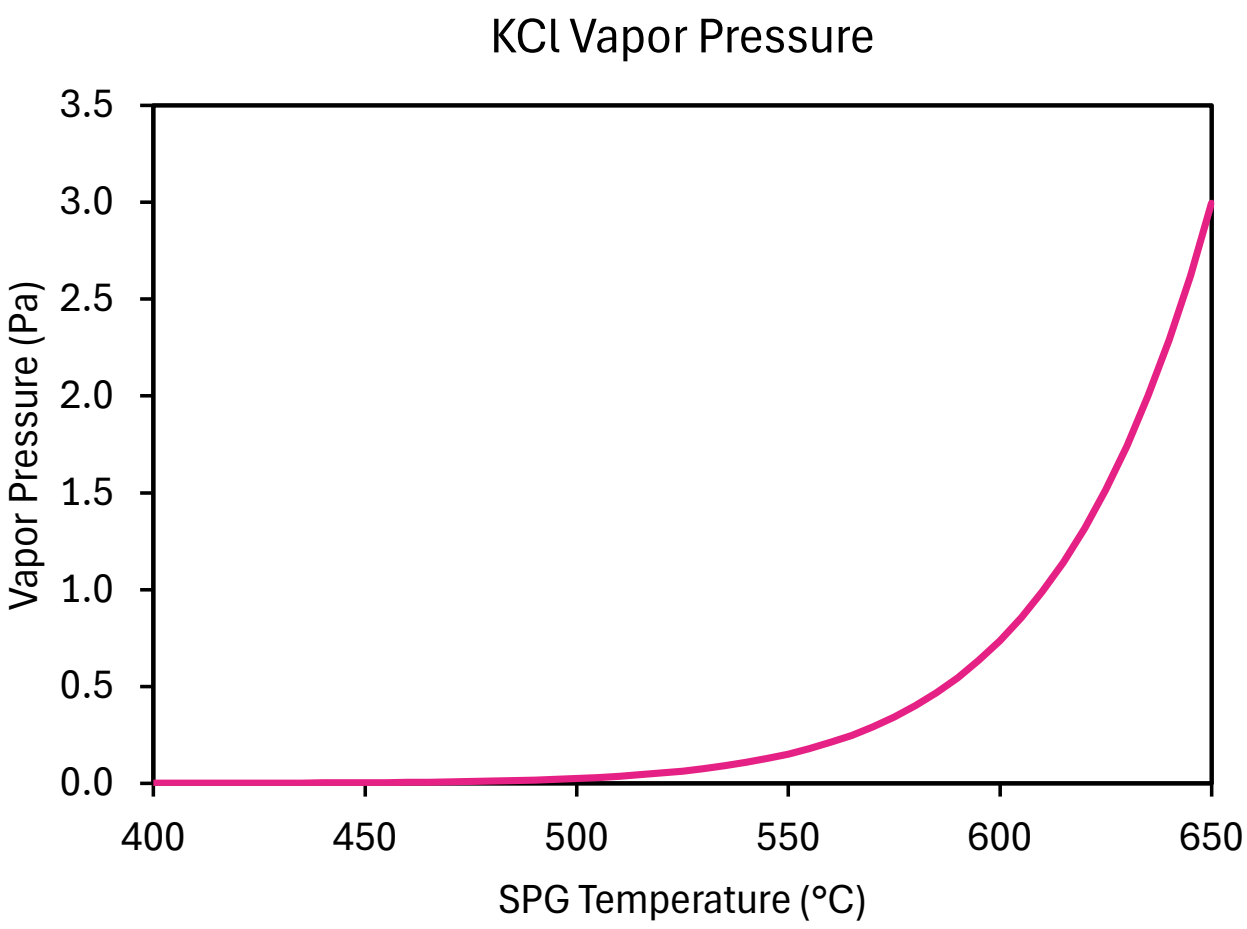




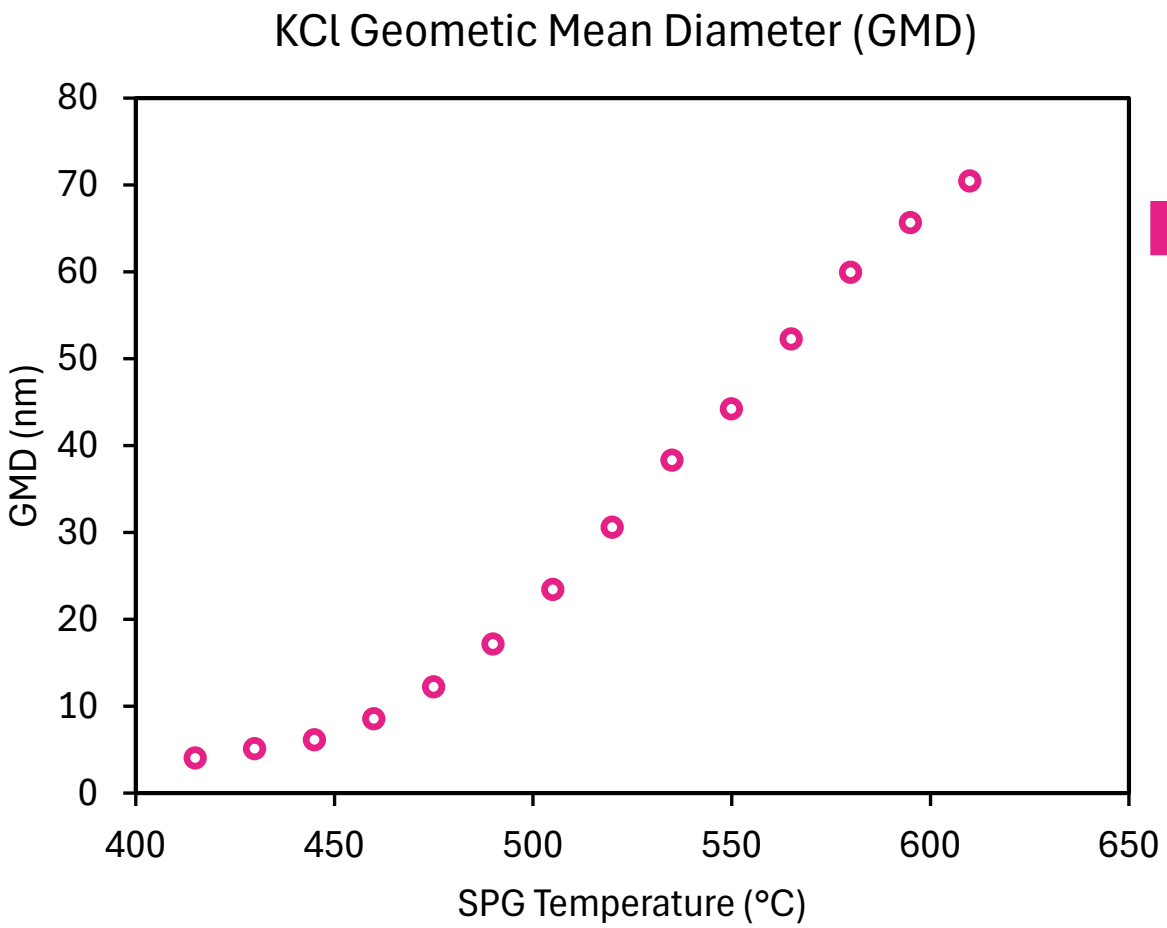
Krasa *et al.* (2025). *Aerosol Science and Technology* 59 (9):1151

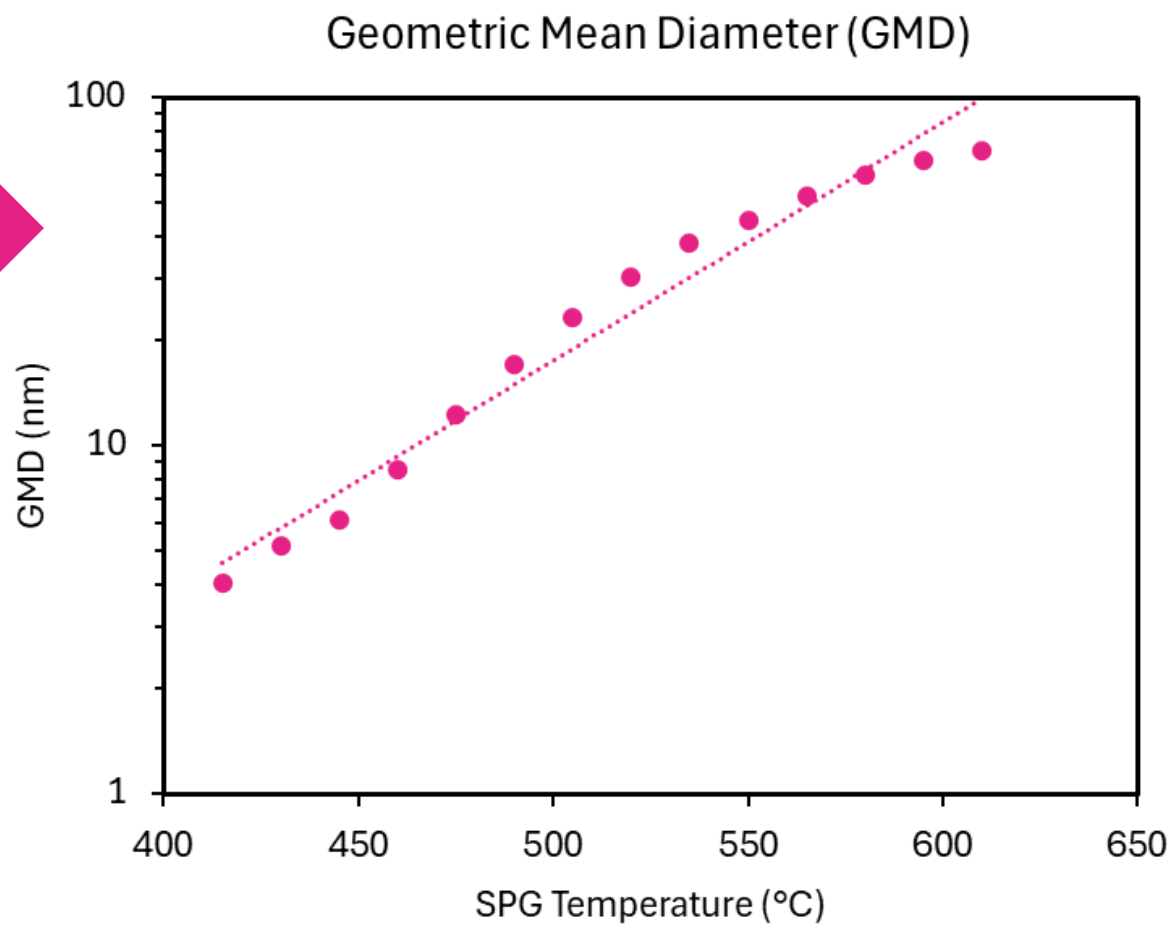
Potassium Chloride (KCl)



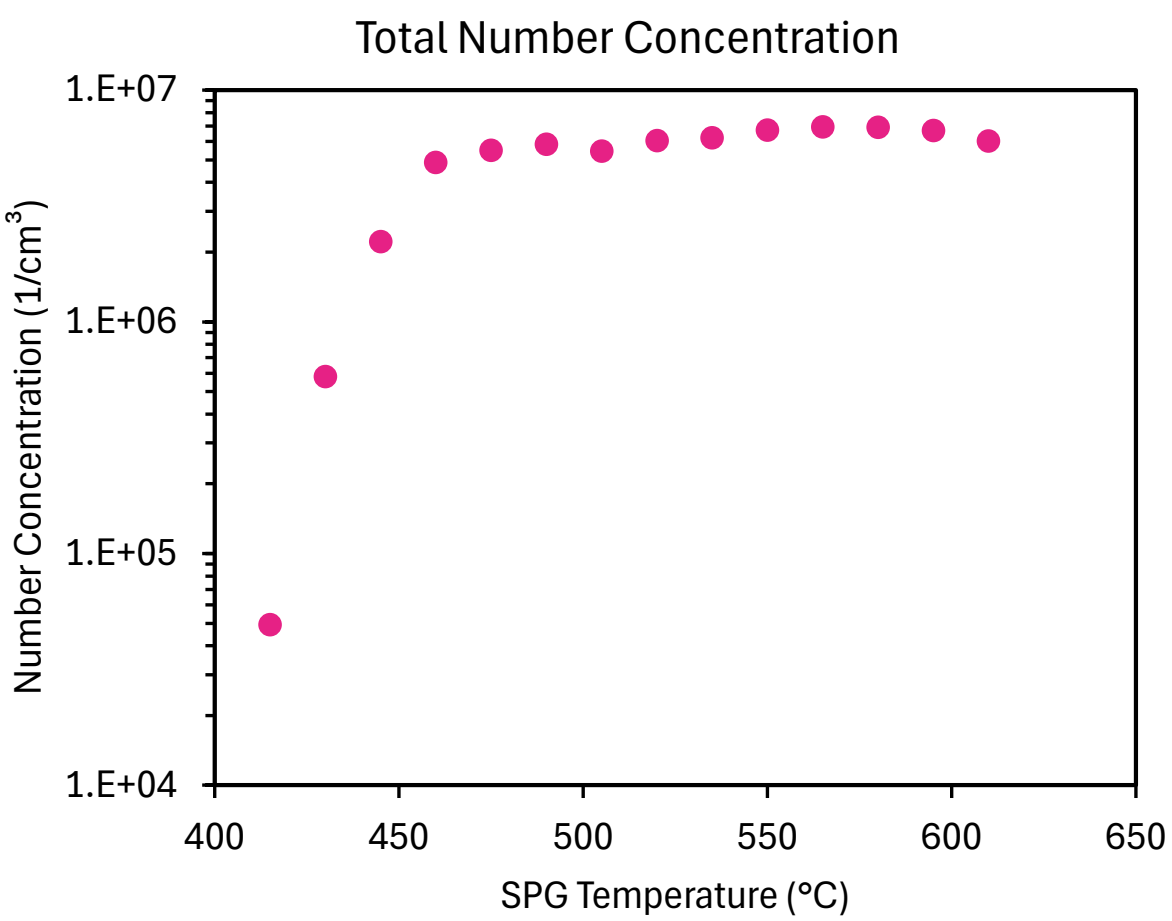


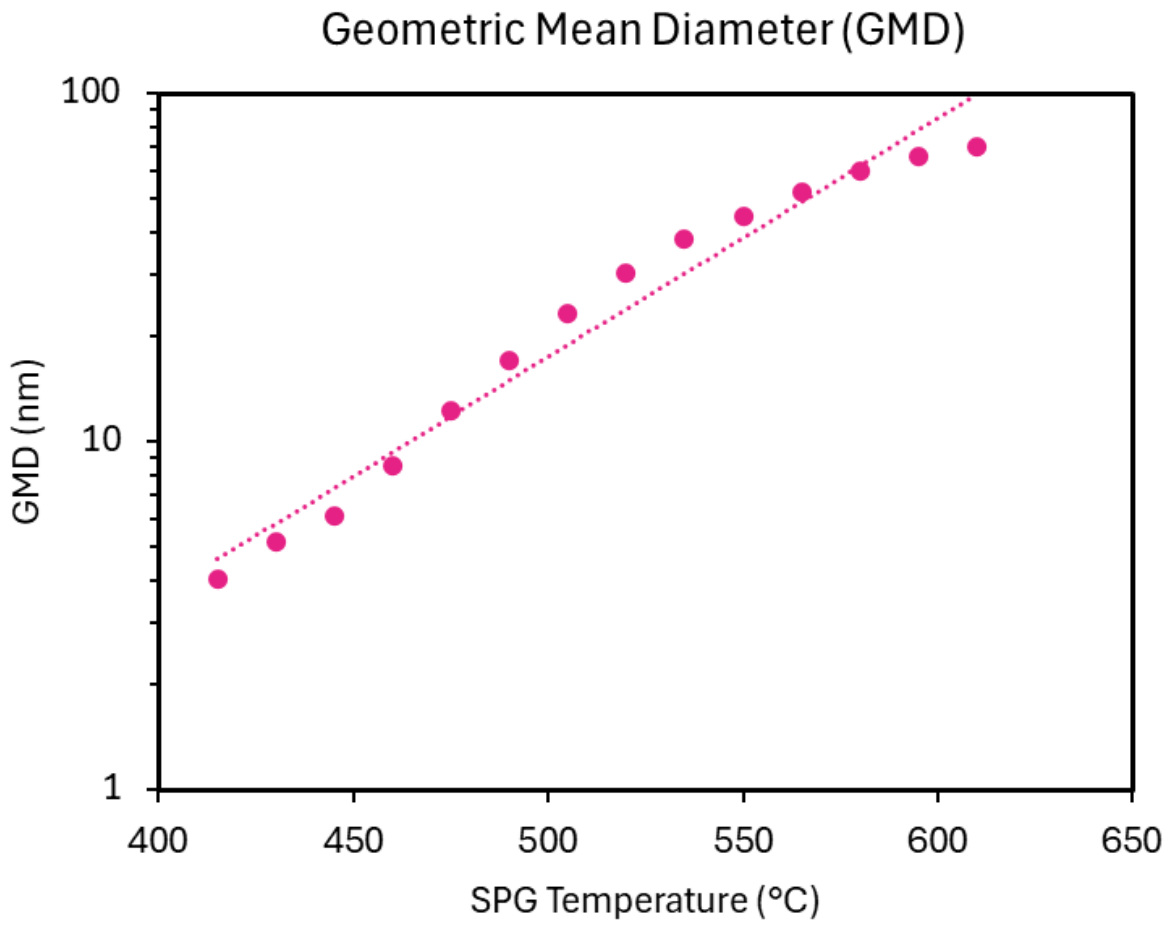
Potassium Chloride (KCl)



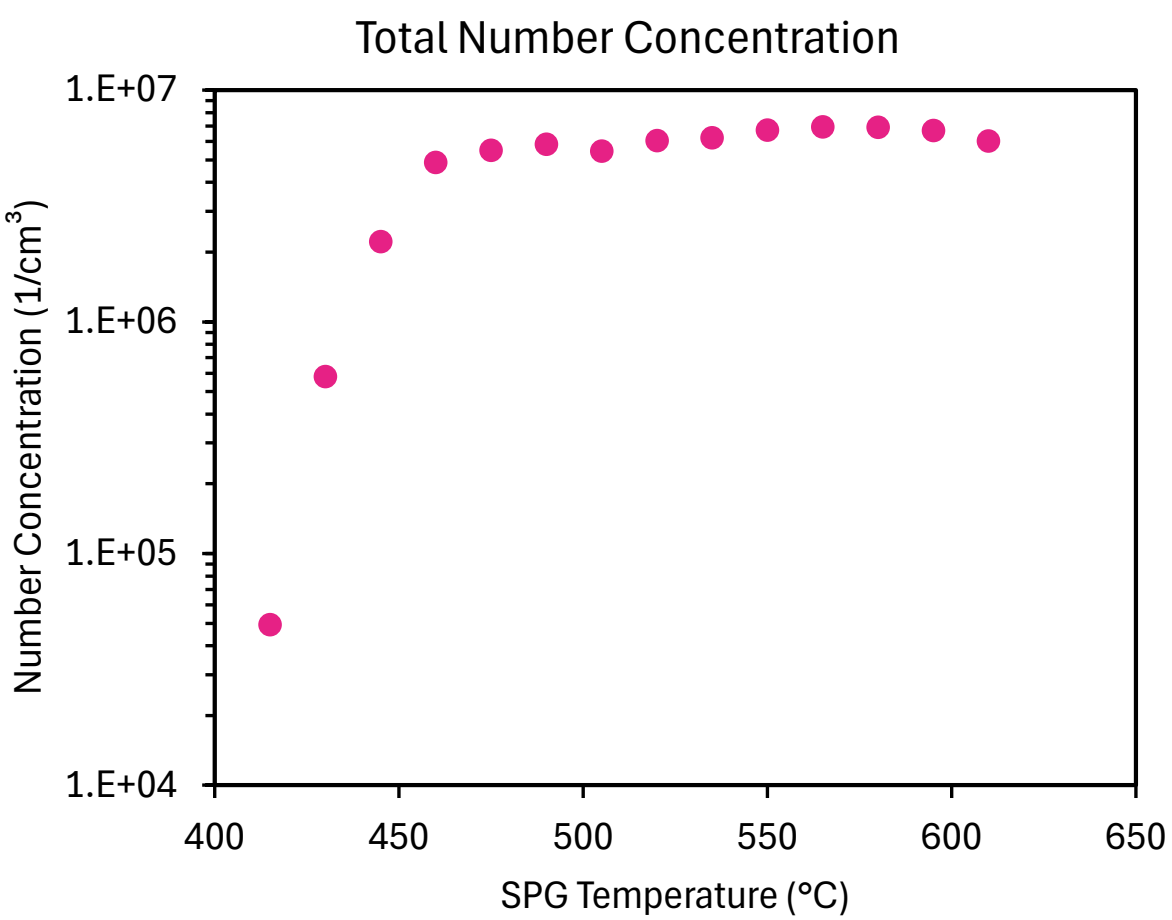


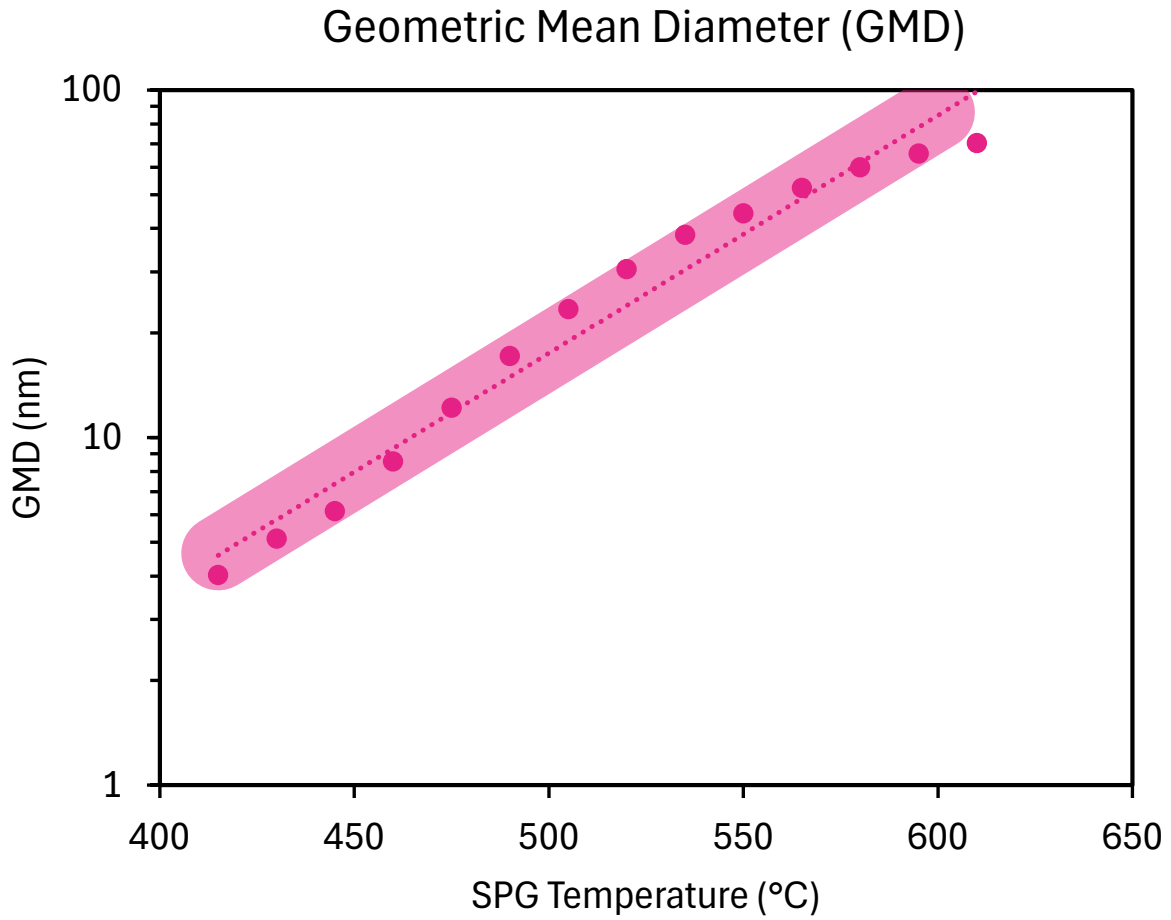
Potassium Chloride (KCl)



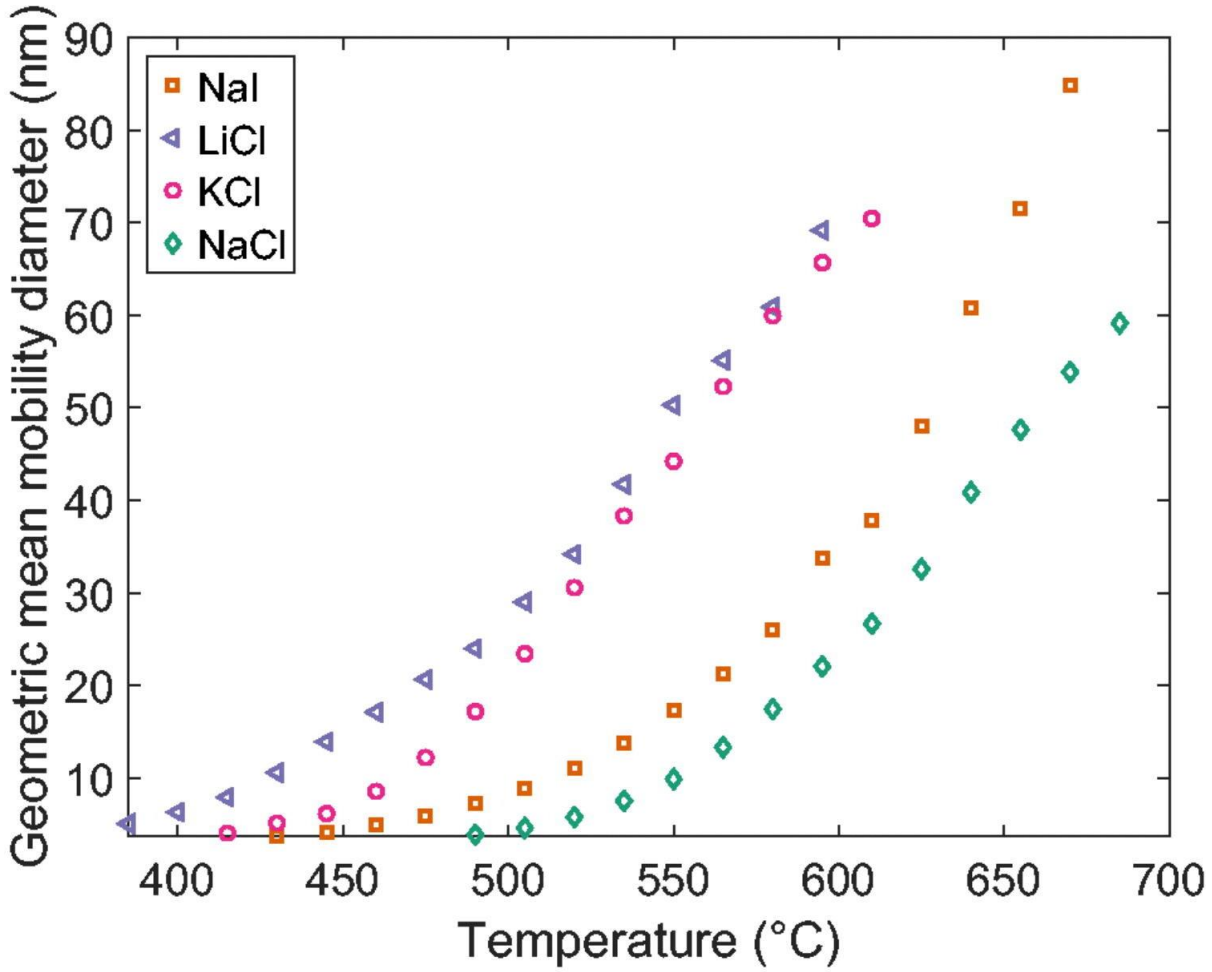


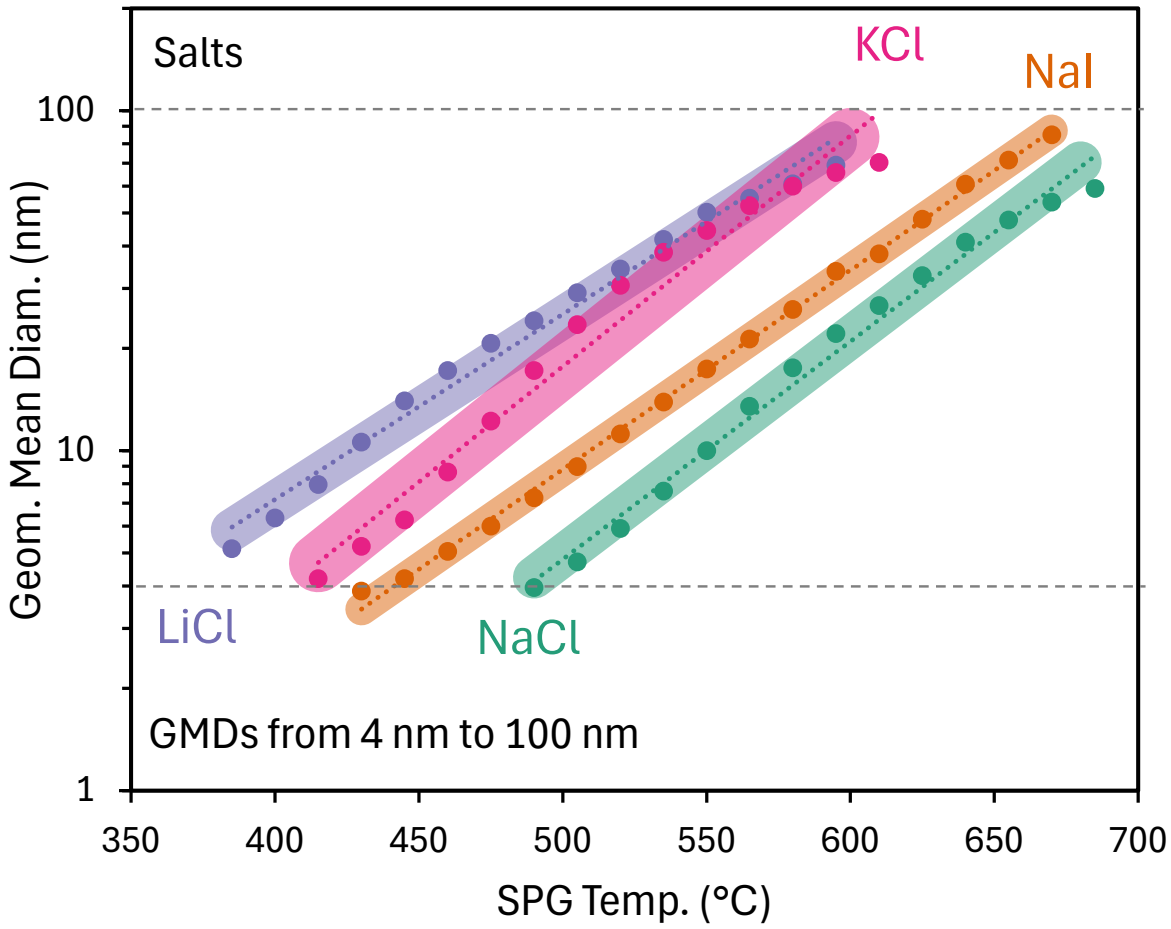
Potassium Chloride (KCl)





Salts at Medium Temperatures





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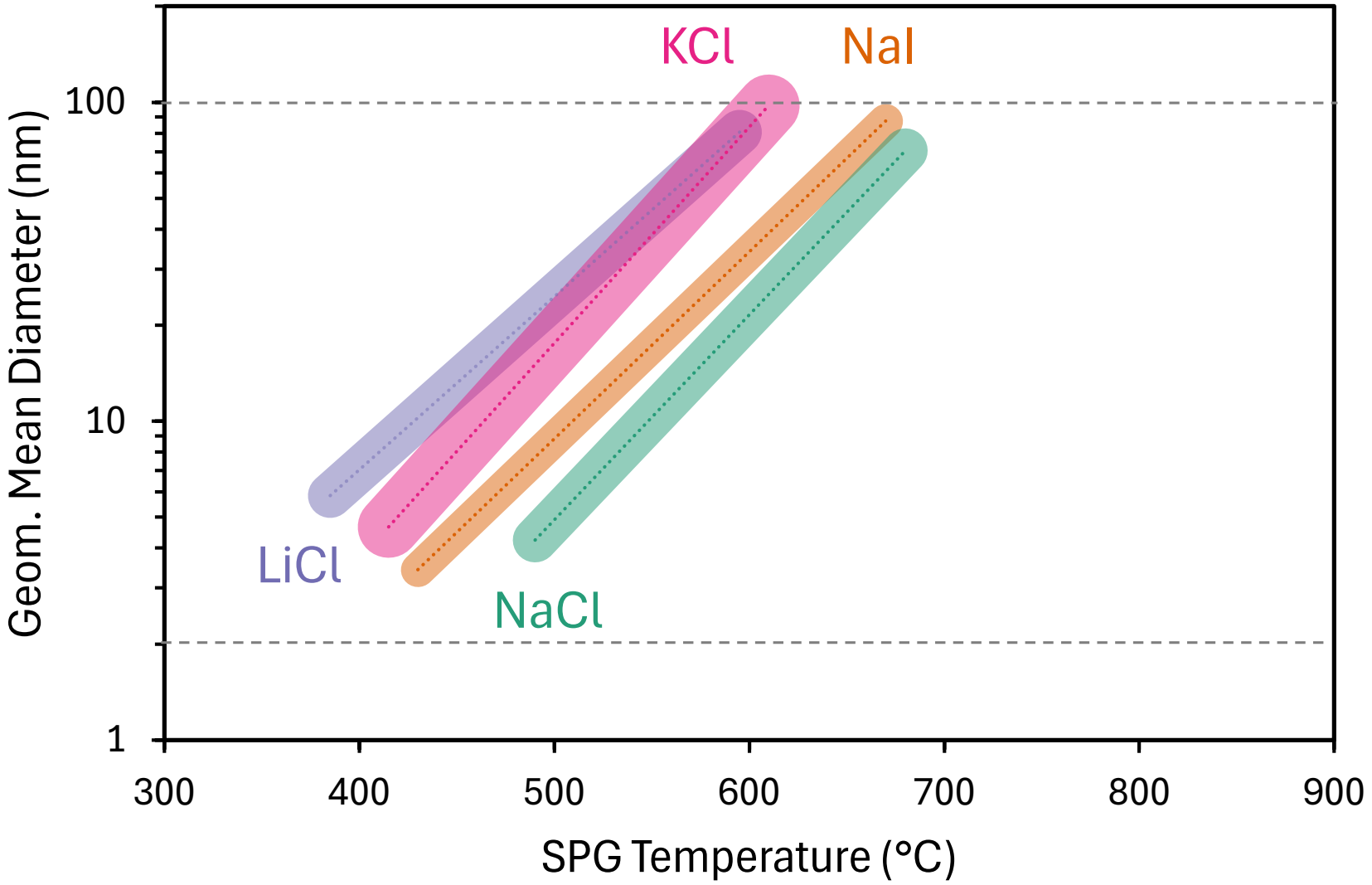
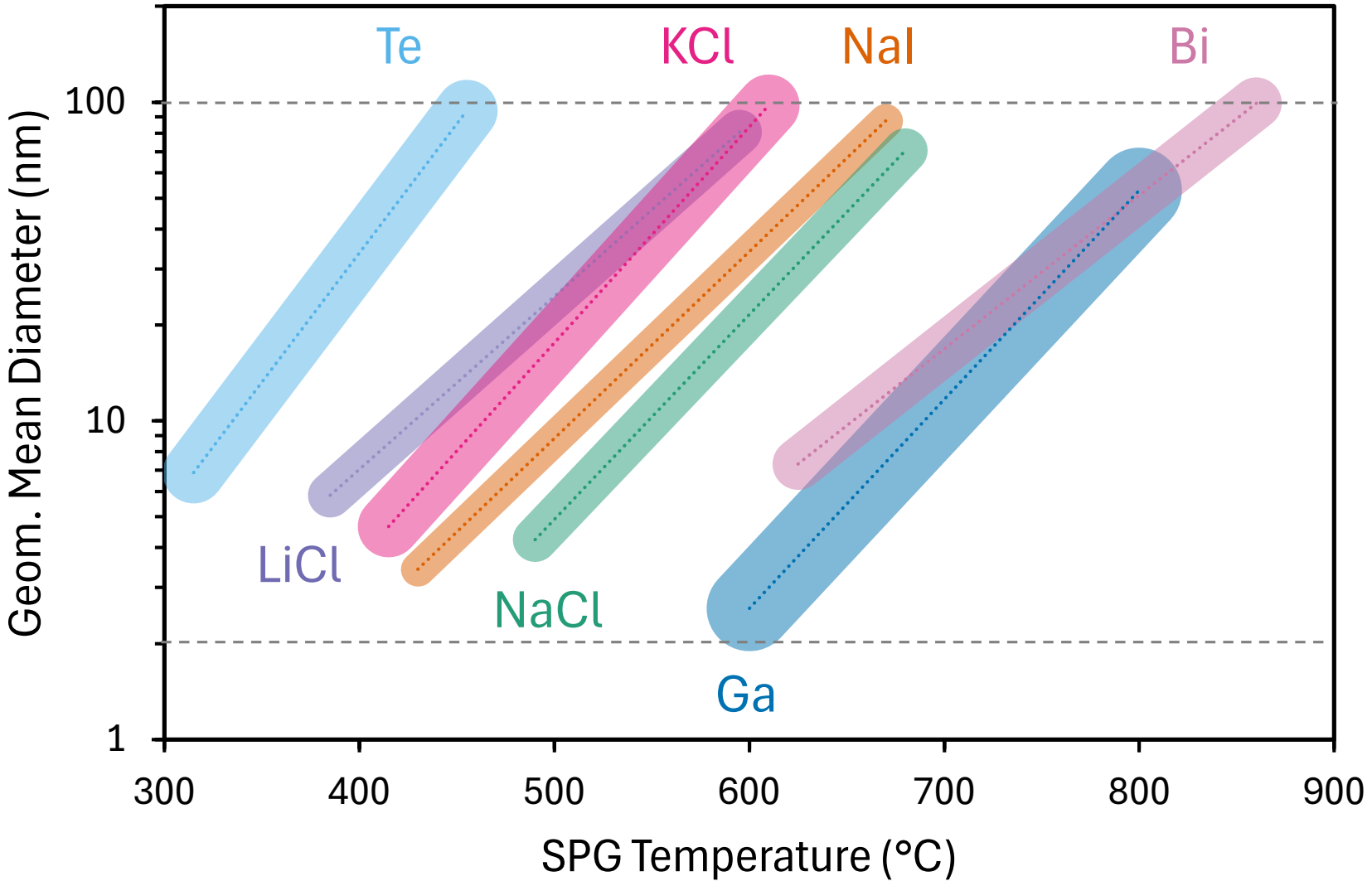
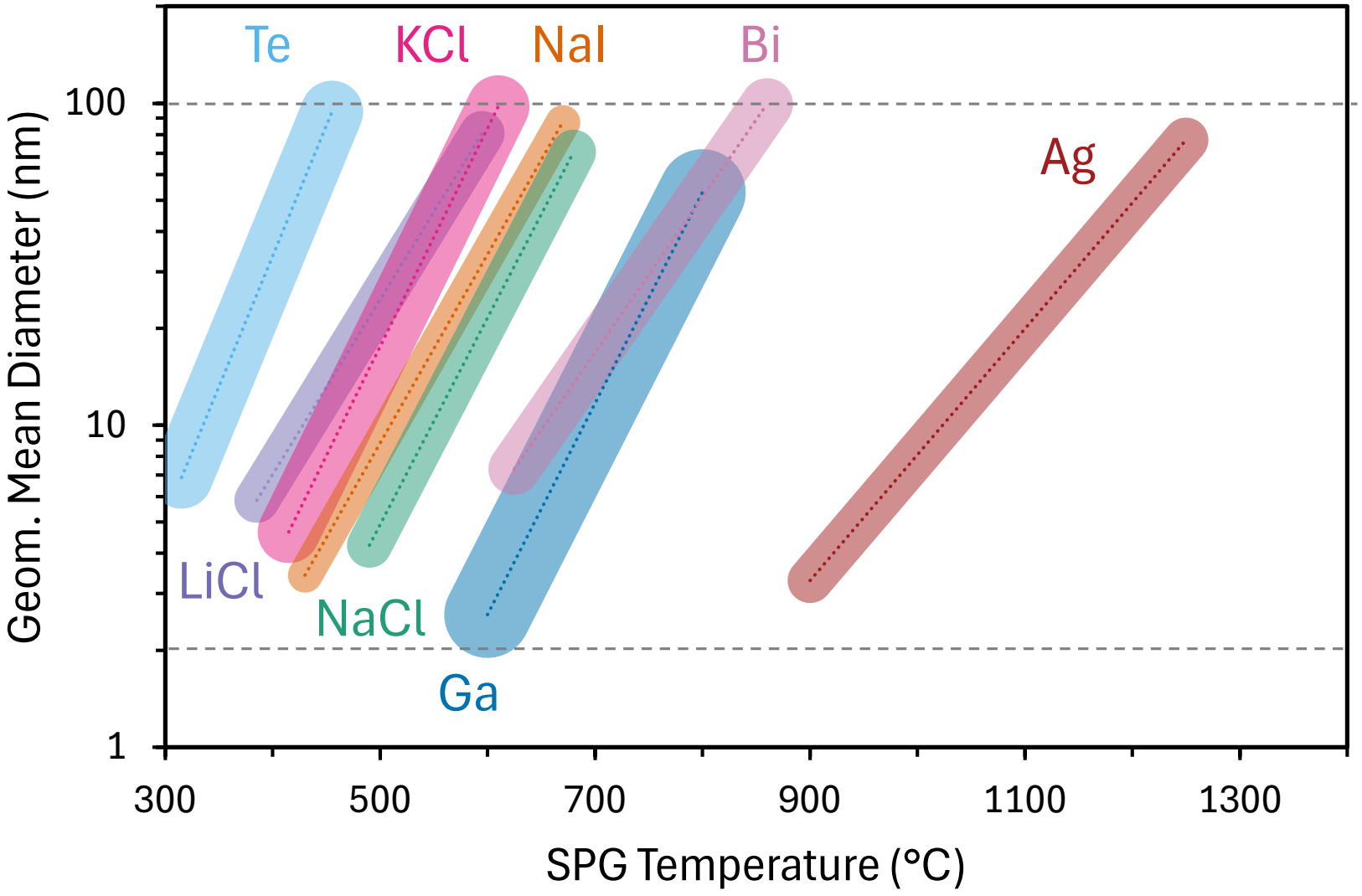
Medium Temperature Materials



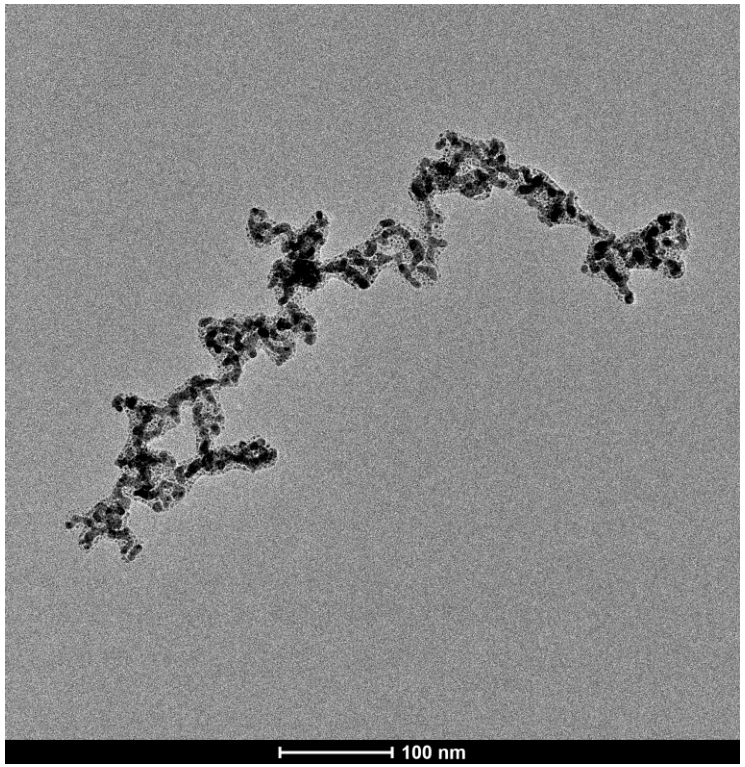
Medium Temperature Materials



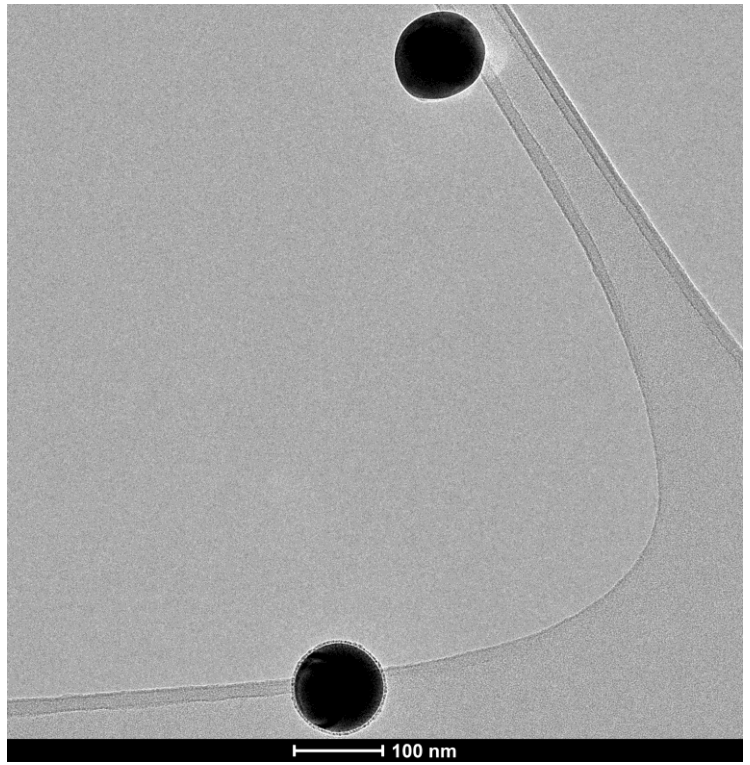
Medium and High Temperature Materials



Silver Particles



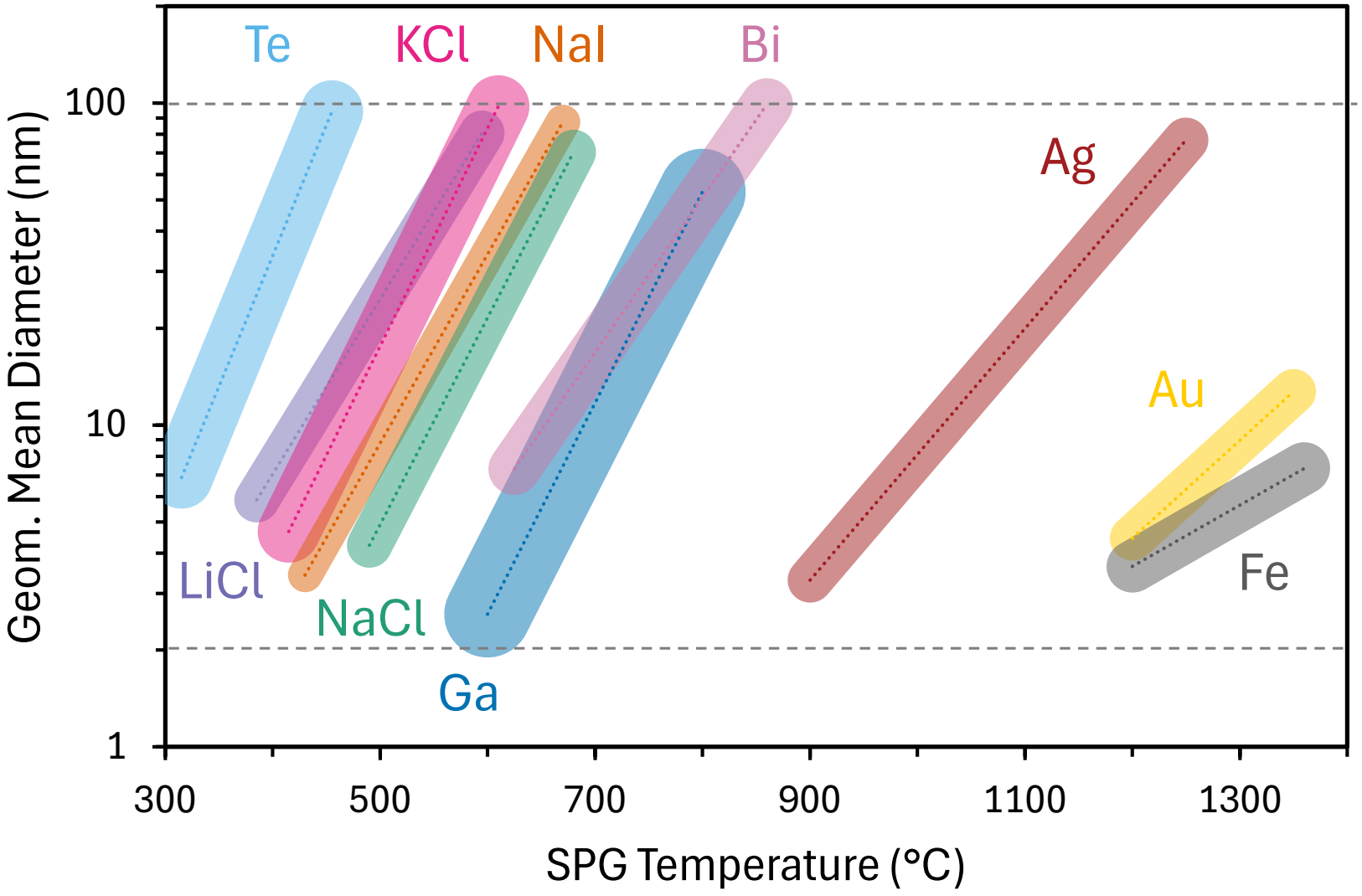
SINTERING
S8000 @ 400 °C



≈ 100 nm

- solid, rather unreactive, normally insoluble
- can be formed to a thermally stable and compact sphere (sintering)

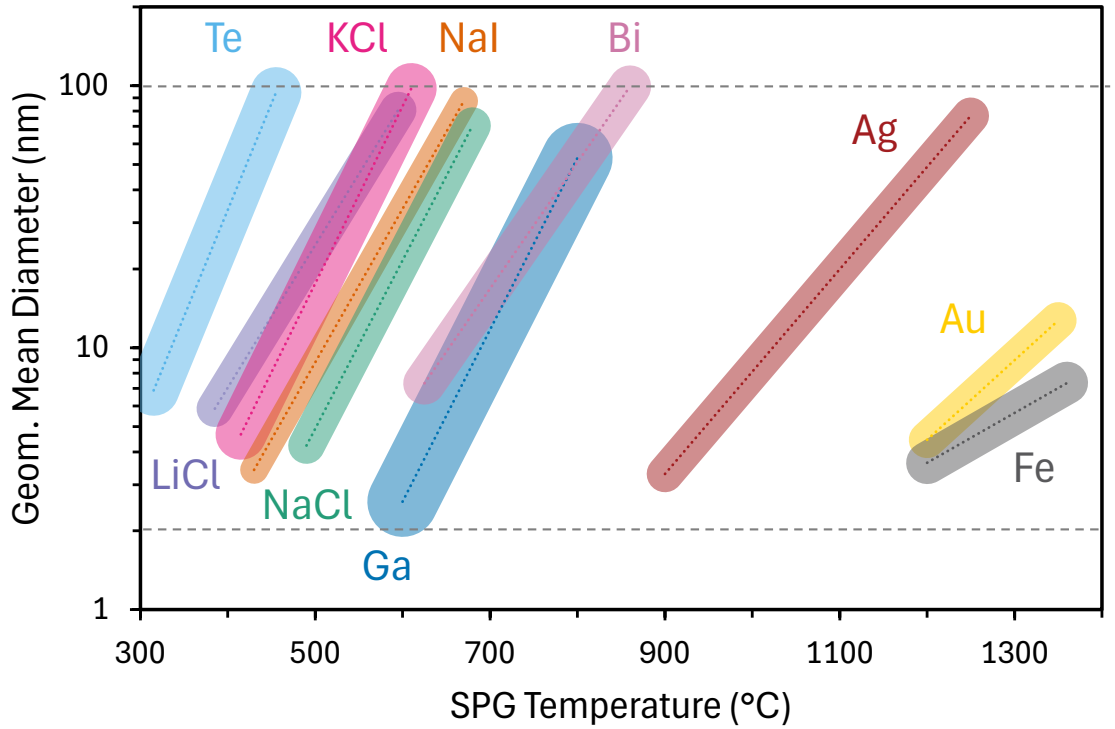
Medium and High Temperature Materials



Conclusion

- SPG generates aerosol of various materials by evaporation-condensation
- Precise, fast and easy control
- Stable and high repeatability
- Simple exchange of tube sets

- Contact us with your material needs!



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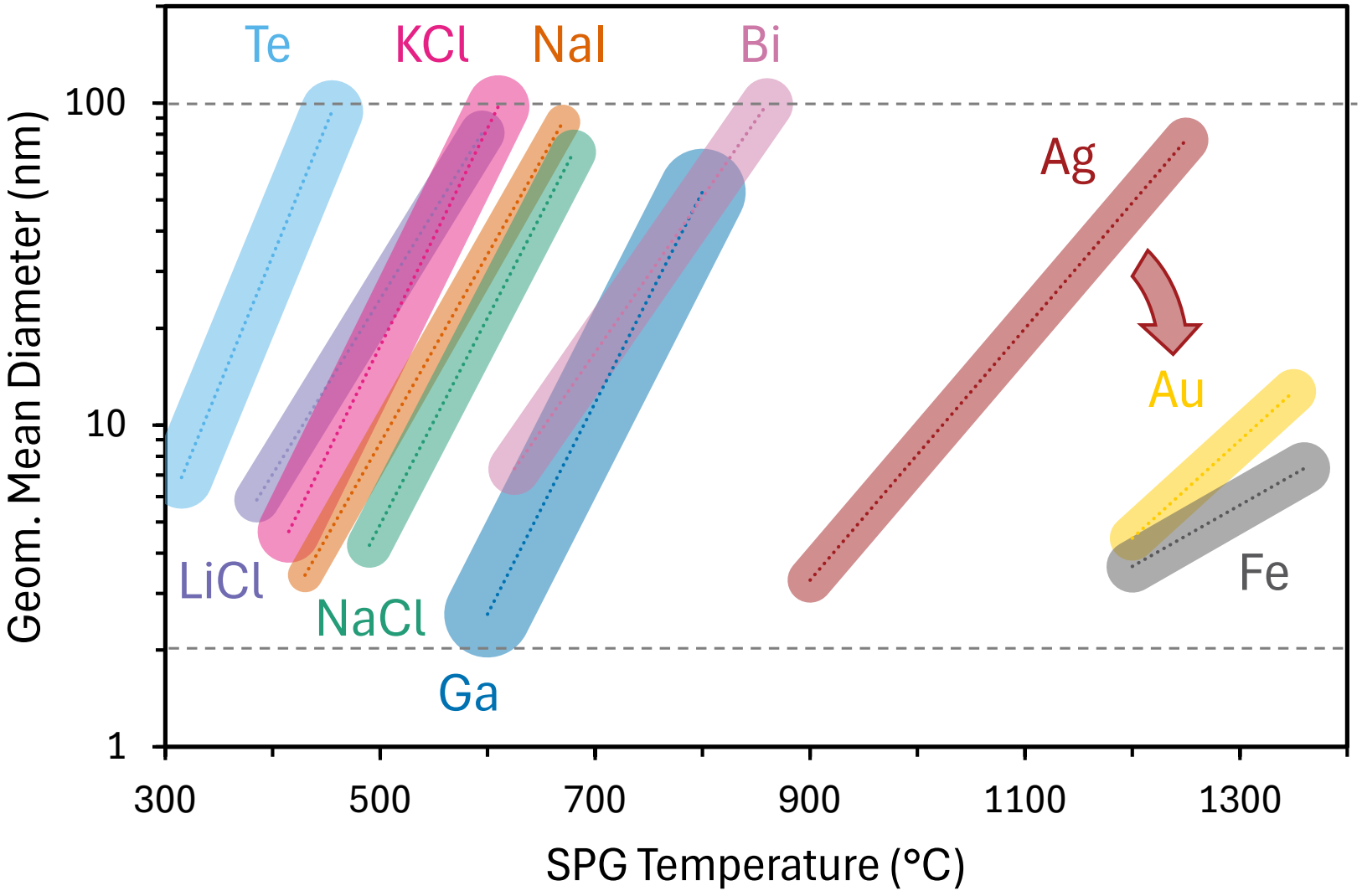
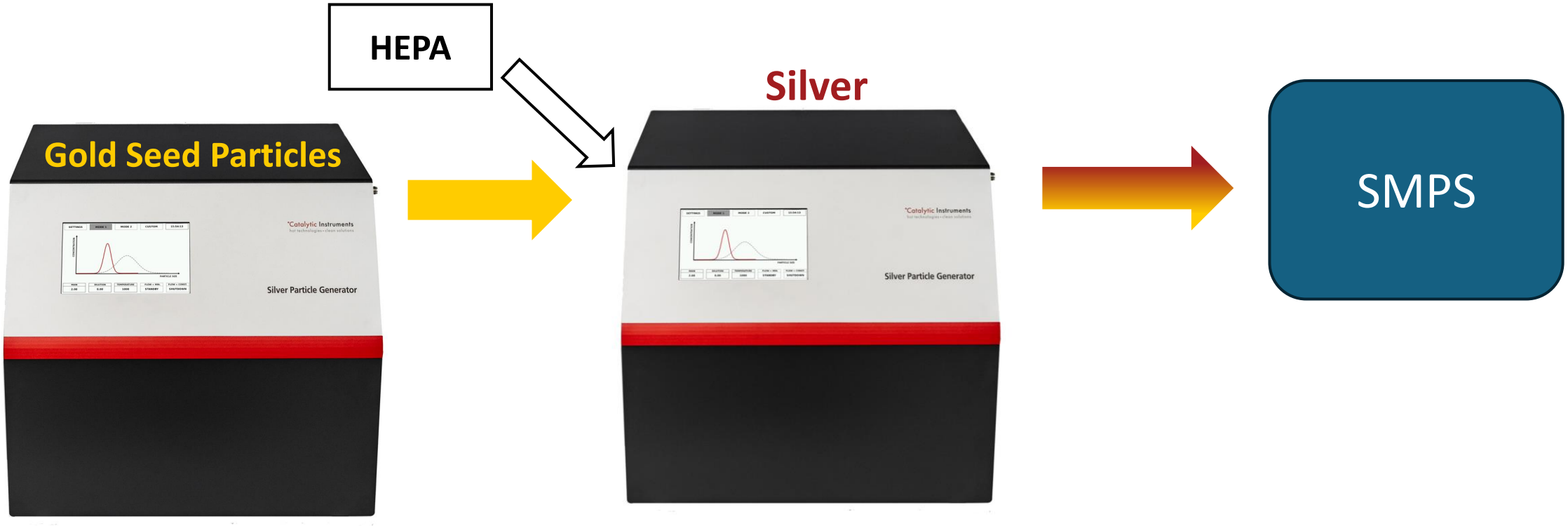
Silver on Gold seed particles

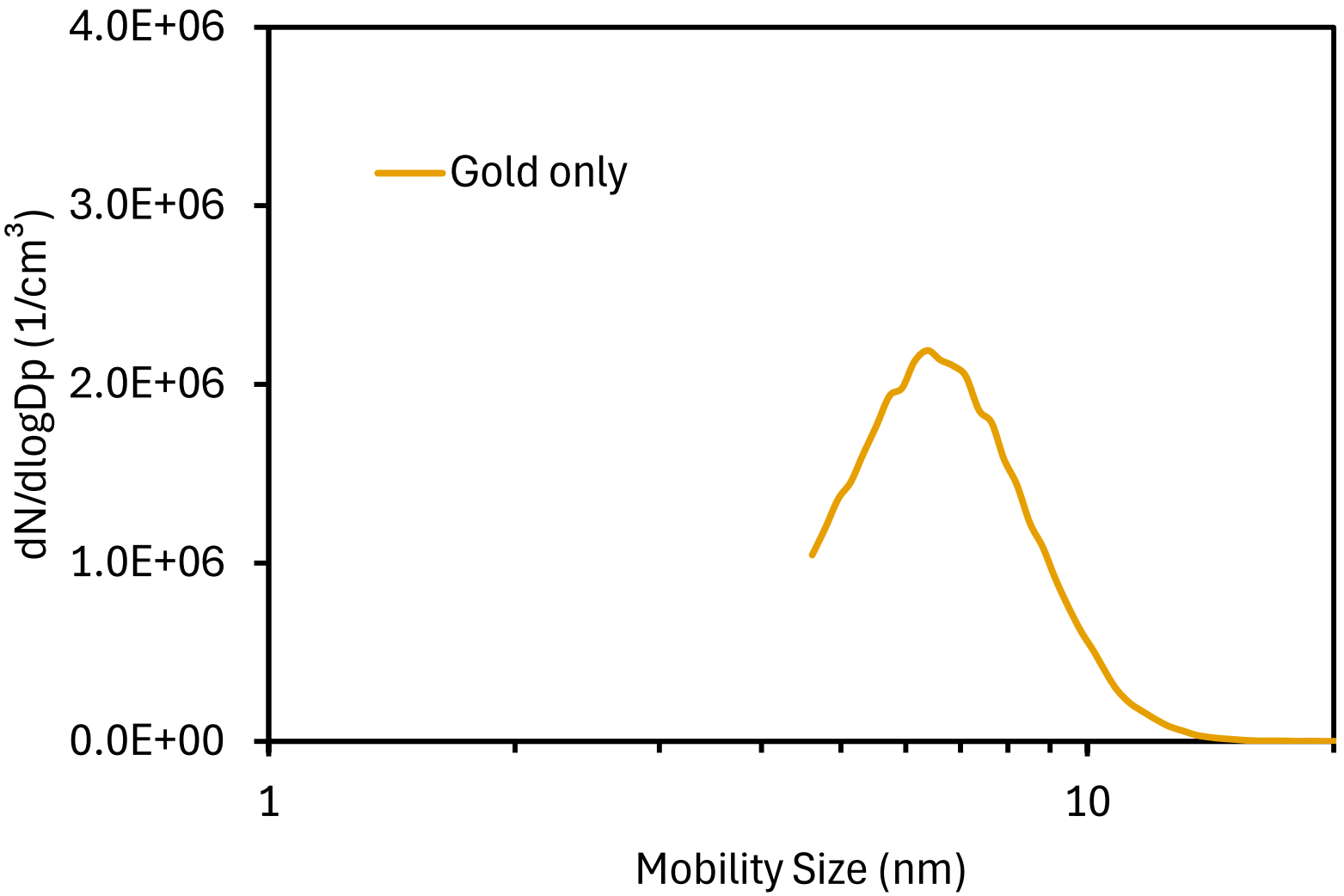


Experimental Setup



- Gold seed particles routed into silver SPG for heterogeneous nucleation
- Tested homogeneous nucleation with HEPA filter

Tandem SPG experiments



Tandem SPG experiments