

# Ice Nucleation Activity of Aged Diesel Soot

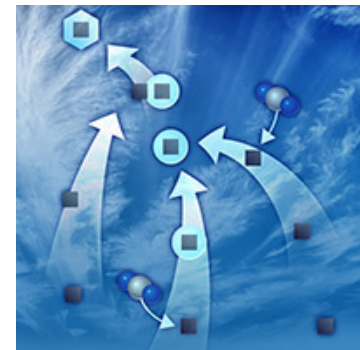
**Objective:** Investigate effects of different aging processes on diesel soot's ice nucleation activity

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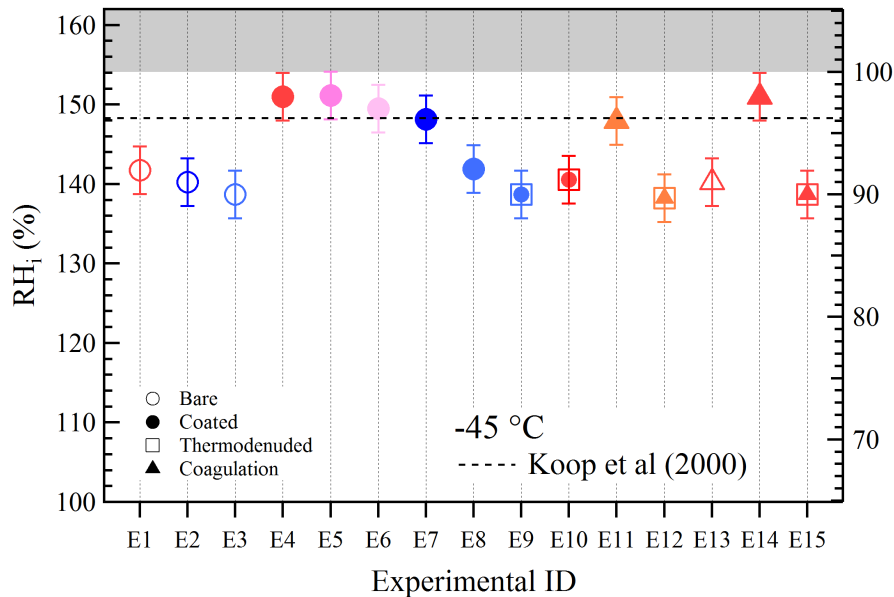
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## Summary of progress:

- Size-selected diesel soot particles were physically and chemically aged in an environmental chamber.
- Ice formation was determined at temperatures ranging from -40 to -50 °C using a continuous flow diffusion type ice nucleation chamber.
- Effects of hydration, SOA coating at low and high RH, soot morphology, and coagulation were investigated.



# Results



E1	Diesel soot only
E2	Diesel soot + 80% $RH_w$ + dried
E3	Diesel soot + 80% $RH_w$ + dried
E4	Diesel soot + $\alpha$ -pinene coating
E5	Diesel VOC + toluene coating
E6	Diesel soot + toluene coating
E7	Diesel soot + $\alpha$ -pinene coating + 80% $RH_w$ + dried
E8	Diesel soot + 80% $RH_w$ + $\alpha$ -pinene coating
E9	Diesel soot + 80% $RH_w$ + $\alpha$ -pinene coating + dried + thermodenuder
E10	Diesel soot + $\alpha$ -pinene coating + thermodenuder
E11	Coagulation: SOA1 (AS + $\alpha$ -pinene coating) + SOA2 (diesel soot + $\alpha$ -pinene coating)
E12	Coagulation: SOA1 + SOA2 + thermodenuder
E13	Coagulation: Diesel soot and SOA1
E14	Coagulation: Diesel soot + second $\alpha$ -pinene coating
E15	Coagulation: Diesel soot + second $\alpha$ -pinene coating + thermodenuder

## Main Conclusions

- Bare soot showed ice formation activity at sub-saturation conditions w.r.t. water.
- Hydration improves ice nucleation efficiency.
- SOA coating at dry RH makes particles poor IN.
- SOA coating at high RH improves ice nucleation efficiency.
- Coagulation retains ice nucleation efficiency of bare soot.

Kulkarni, G., S. China, S. Liu, M. Nandasiri, N. Sharma, J. Wilson, A.C. Aiken, D. Chand, A. Laskin, C. Mazzoleni, M.S. Pekour, J. Shilling, V. Shutthanandan, A. Zelenyuk, and R.A. Zaveri. Ice nucleation activity of diesel soot particles at cirrus relevant temperature conditions: Effects of secondary organics coating, hydration, soot morphology, and coagulation, [Geophys. Res. Lett.](#), 2016.