

## 1. Supplementary information

Table S1. Geometric standard deviations (GSD) of the size distribution data shown in Figure 4. All other information is duplicated from Table 1.

Short name	Composition		Properties	
	Flow 1	Flow 2	GMD (nm)	GSD
P	Propane	-	185	2.1
P-air	Propane	Air	104	1.9
PA <sup>a</sup>	Propane	Acetylene	168	n.a.
PO <sup>b</sup>	Propane	-	154	2.0
PAO	Propane	Acetylene	160	2.0
PD	Propane	DME <sup>e</sup>	95	1.9
AD	Acetylene	DME	110	2.2
E	Ethylene	-	128	1.9
PE	Propane	Ethylene	128	1.9
ED	Ethylene	DME	139	2.1
PM	Propane	Methane	153	1.9
MD <sup>c</sup>	Methane	DME	n.s.	n.s.
EM <sup>d</sup>	Ethylene	Methane	110	2.1

<sup>a</sup>The size distribution of this flame was bimodal (see **Error! Reference source not found.**). <sup>b</sup>Oxygen-enriched air flow. <sup>c</sup>n.s.: non-sooting for all stable flow conditions. <sup>d</sup>This setpoint was notably unstable, with GMD ranging from 100 to 120 nm on a single day. <sup>e</sup>DME: dimethyl ether.

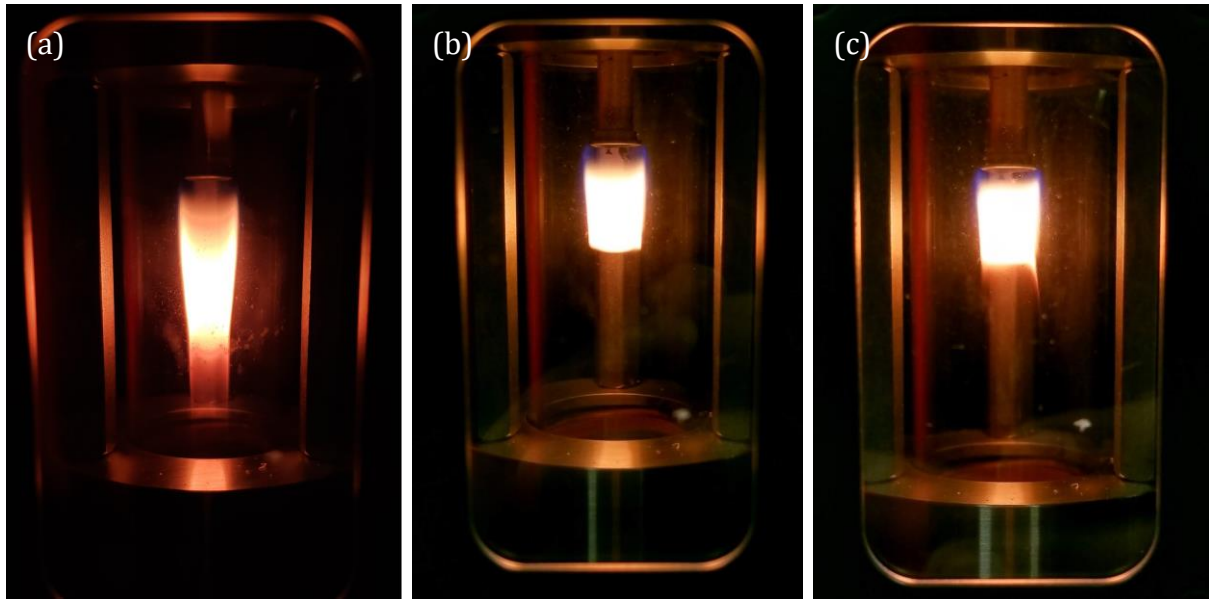


Figure S1. Flame shapes observed while operating the MISG: (a) open-tip flame, which produces the highest soot concentrations; (b) closed-tip flame, which produced low soot concentrations; and (c) asymmetric-base flame, which often resulted in rapid soot accumulation at the fuel port (top of image). Flame type (a) often flickered in this study.



Figure S2. Photograph of the custom-made double-height burner.

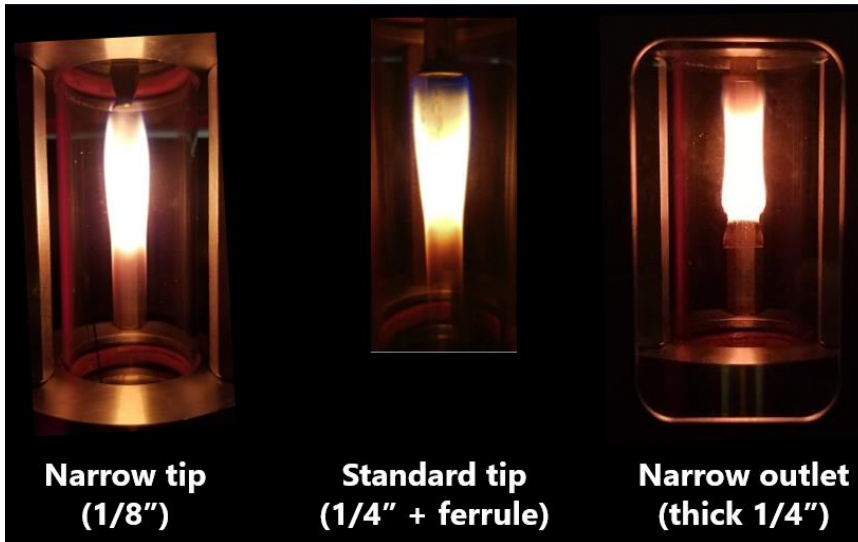


Figure S3. Photographs of the MISG flame with modifications to the fuel port.

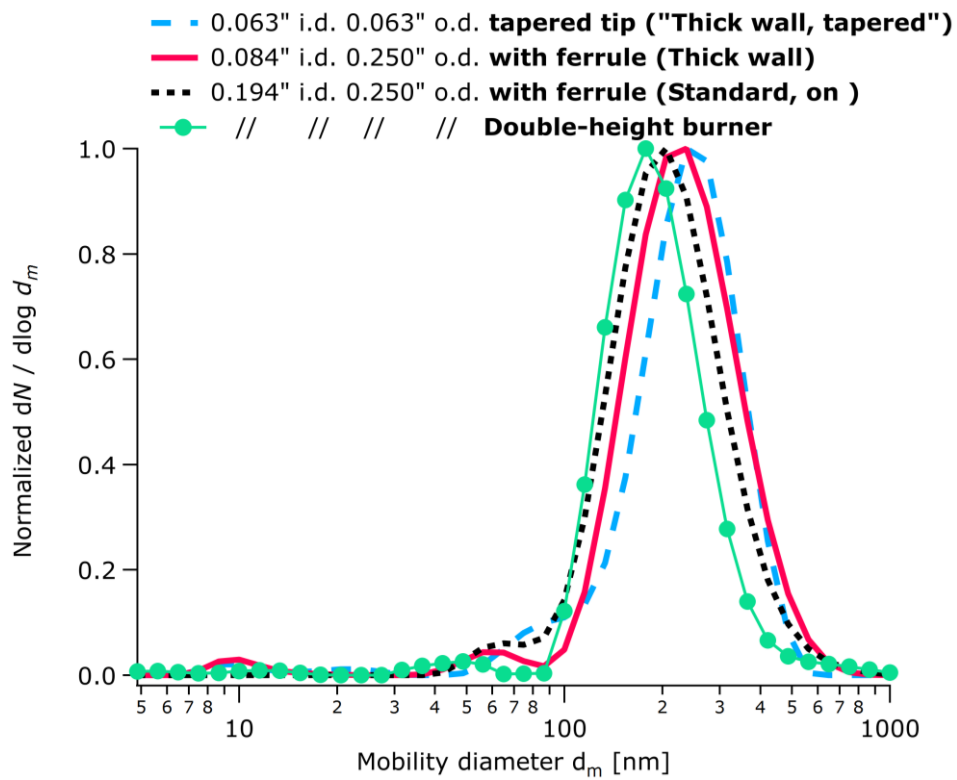


Figure S4. SMPS data acquired with the MISG after with modifications to the fuel port.