Spicing up Paint! Properties of Cayenne and Paprika as Pigment

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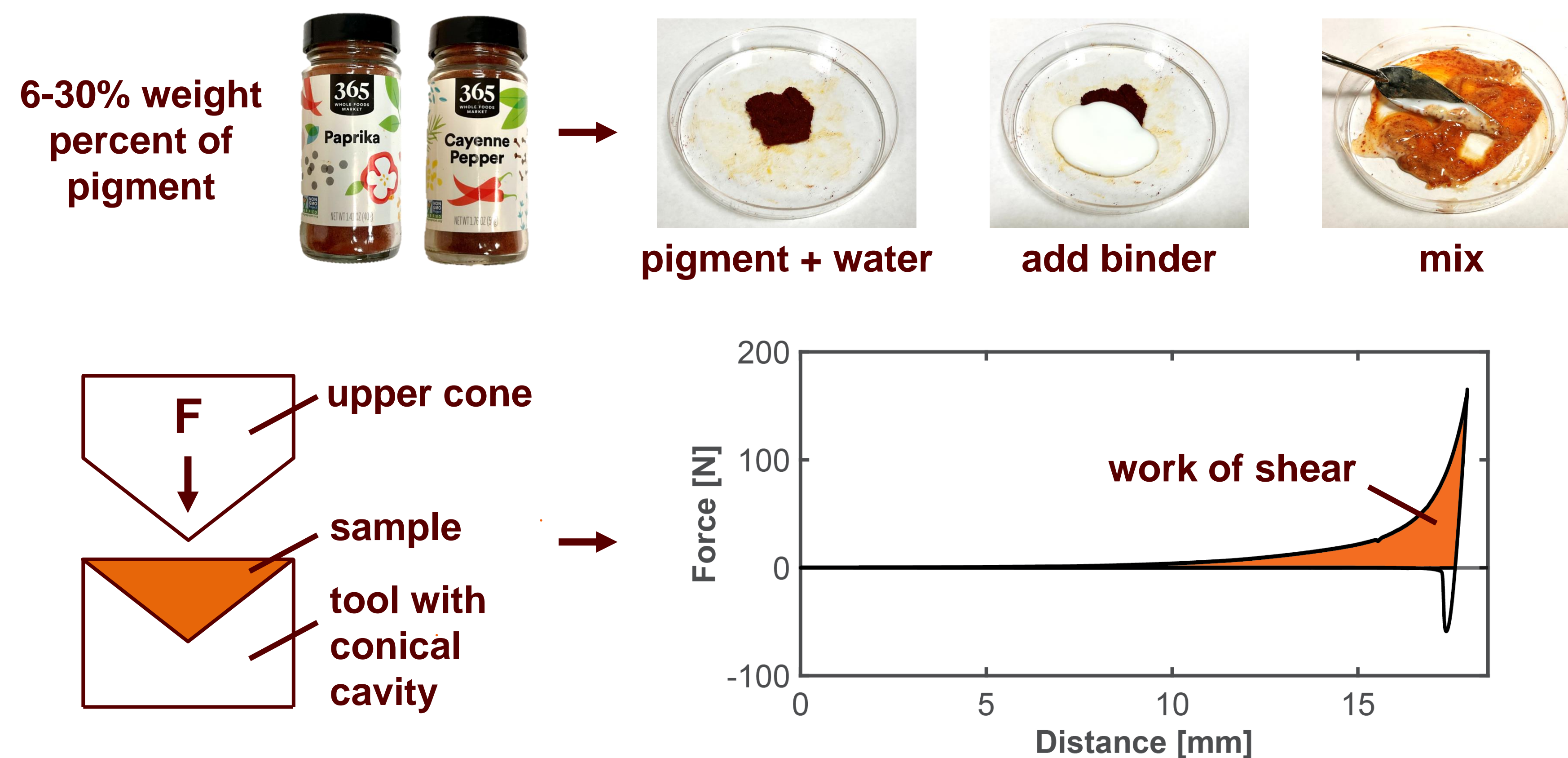
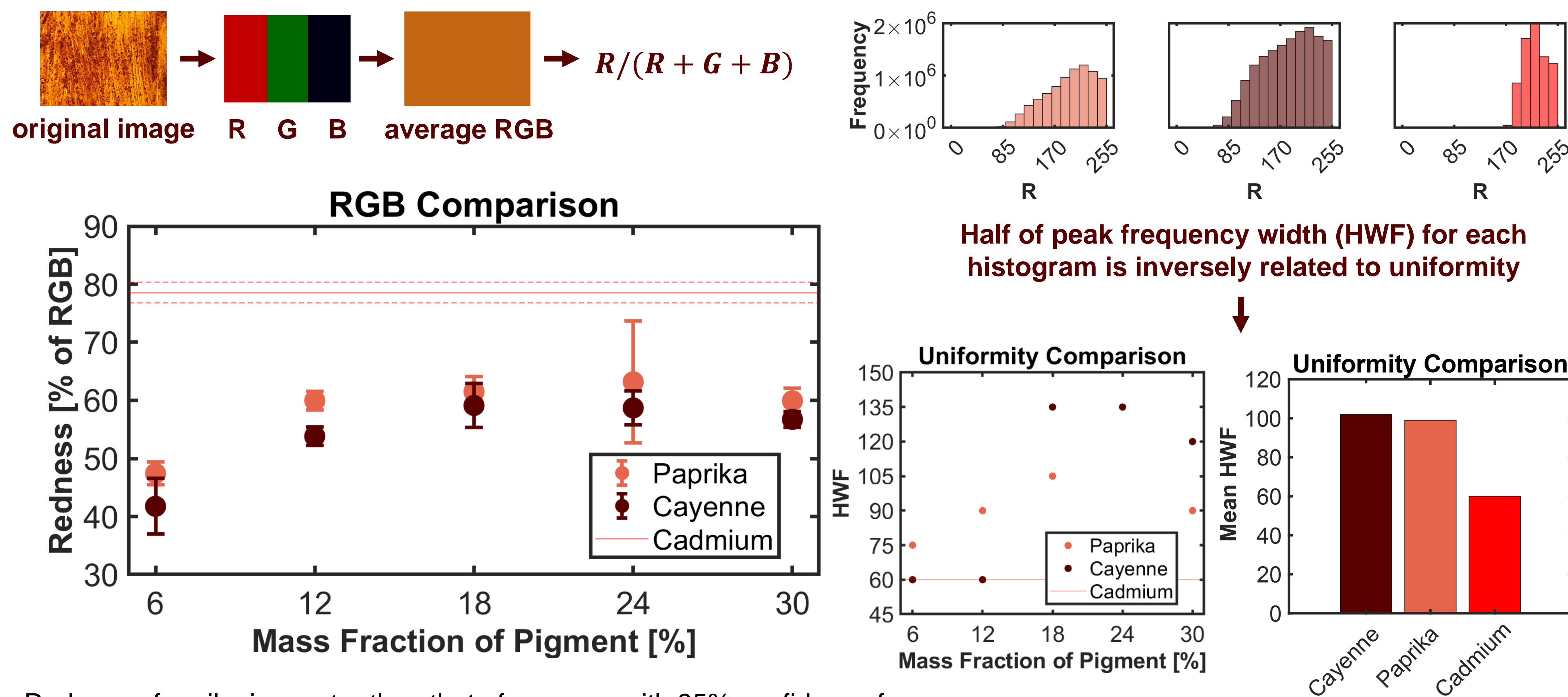2.671 Measurement and Instrumentation

Abstract

Determining if cayenne and paprika are suitable for creating red paint can benefit the environment, the creativity of artists, and the accessibility of painting. Samples with five different mass fractions of pigment for both spices were evaluated. Spreadability—as defined as work of shear of the paint under compression—was measured using a conical rig on a texture analyzer, analogous to work exerted by a brush. Red color is represented as a ratio of the "R"-factor of the average RGB value from swatches of each sample. Properties for spice-based paints were compared to commercially available paint to inform how these paints can be adopted into regular practices. Paprika was found to be more red than cayenne at lower pigment concentrations. For both paints, 12% pigment concentration was most similar to commercially available paint in terms of work of shear and 12 to 30% in terms of redness.
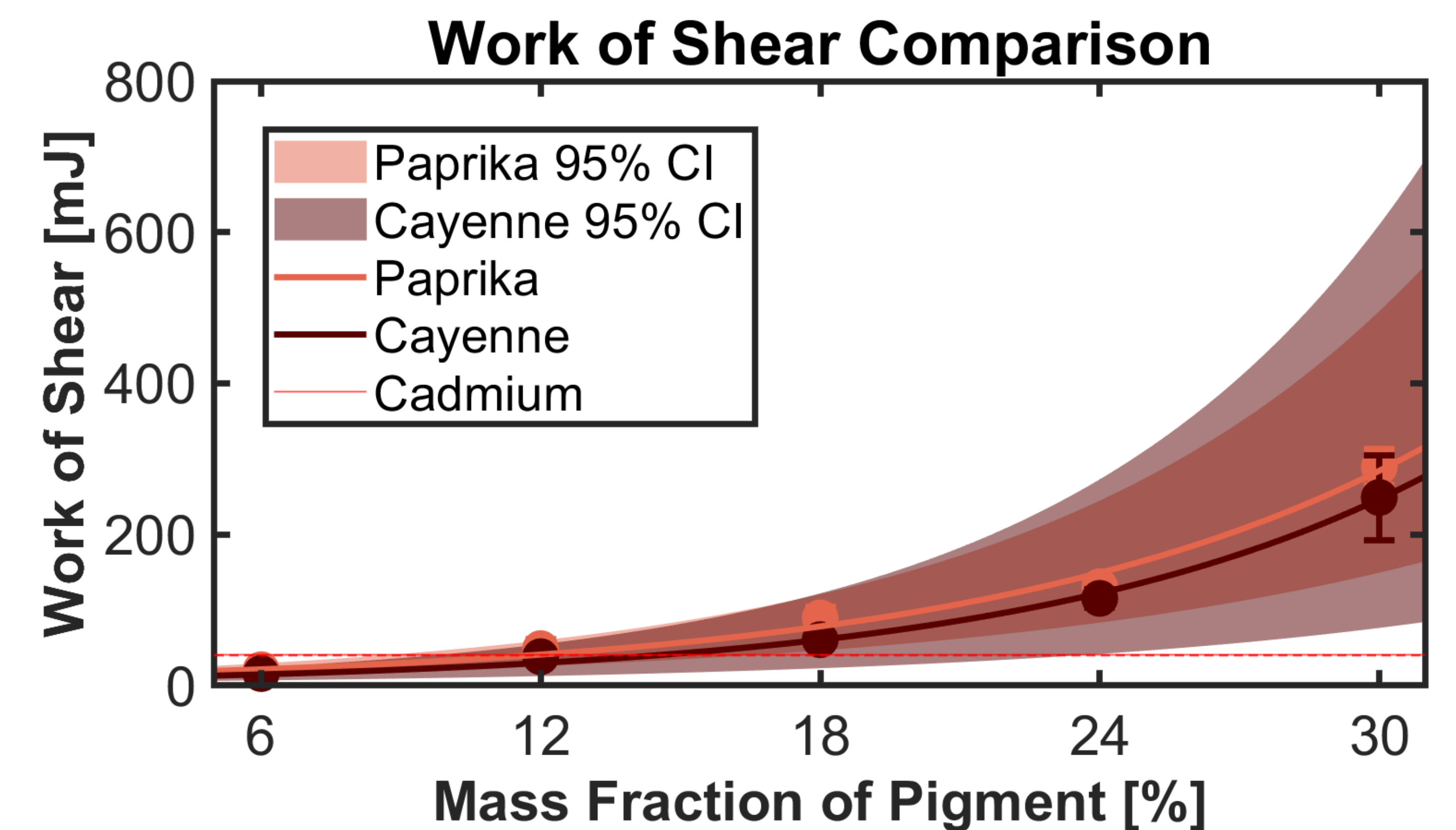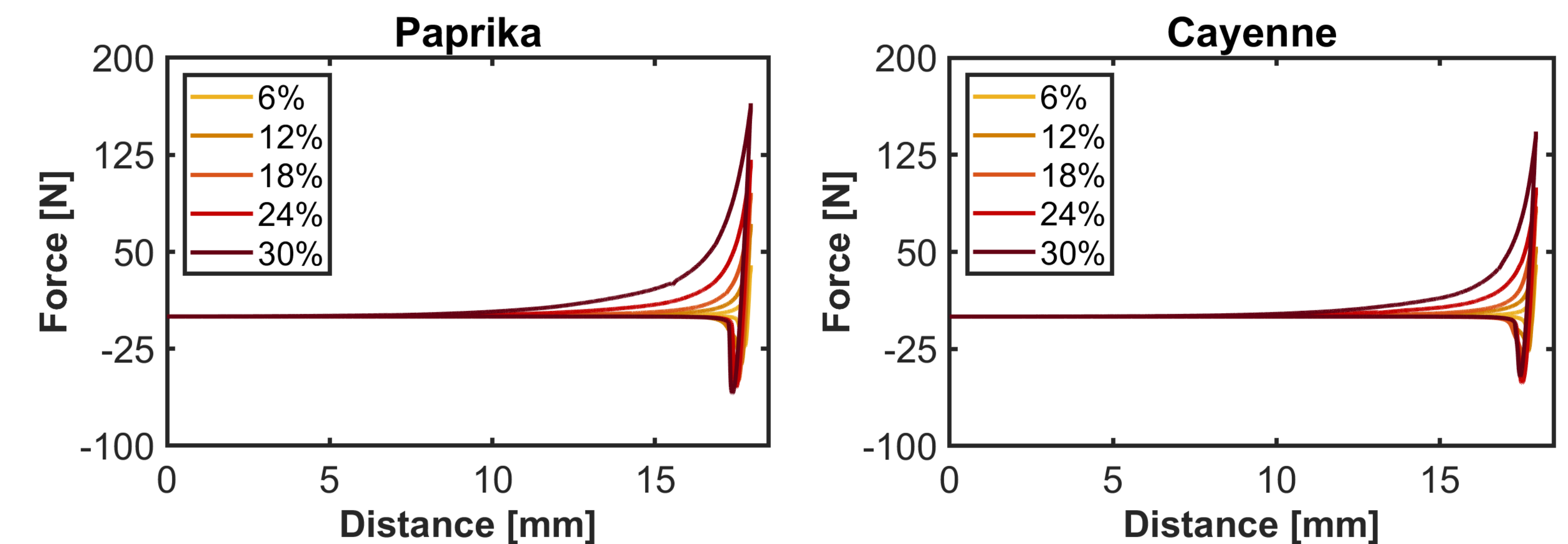
Experimental Methods

6-30% weight percent of pigment

pigment + water → add binder → mix

F → upper cone, sample, tool with conical cavity

work of shear

Color Characteristics

original image → R G B → average RGB → $R/(R + G + B)$

Half of peak frequency width (HWF) for each histogram is inversely related to uniformity

RGB Comparison

Legend: Paprika, Cayenne, Cadmium

Uniformity Comparison

Redness of aprika is greater than that of cayenne with 95% confidence for 6%, 12%, 18%, and 24% by 3.79%, 0.95%, 0.73%, and 1.11% respectively.

Work of Shear

Paprika / **Cayenne**

Work of Shear Comparison

Legend: Paprika 95% CI, Cayenne 95% CI, Paprika, Cayenne, Cadmium

$y = ae^{bx}$ fit where $a = 11.34 \pm 3.24$ and $b = 0.1074 \pm 0.01017$ for paprika and $a = 7.384 \pm 3.568$ and $b = 0.117 \pm 0.0341$ for cayenne.

Conclusions

- **Paprika** with a pigment concentration of 12% is the most suitable spice
- **Paprika** is consistently **more red** than cayenne for pigment concentrations ranging from 6% to 24%
- For both spice-based paints, a pigment concentration of **12%** is very similar to that of cadmium red in terms of **work of shear**
- **Redness** is greatest for pigment concentrations ranging from 12% to 30%, ~20% less than cadmium red
- Future work investigating spice-based paint when pigment is ground to powder may be completed

Acknowledgements

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