

Yunker *et al.* Reply: In the preceding Comment [1], Nicoli, Cuerno, and Castro raised an issue about one aspect of Ref. [2]. Briefly, the Letter [2] presented experimental observations of the growth of deposits at the edges of drying drops of suspensions of ellipsoids with different major-minor axis aspect ratios (ε). Three distinct growth regimes were observed, and the growth regime associated with highly anisotropic ellipsoids was noted to be consistent with the quenched Kardar-Parisi-Zhang (QKPZ) universality class as well as with the Matthew effect. We presented simulations of the Matthew effect to show that much of the growth of the highly anisotropic ellipsoids could be captured by this simple model. Nicoli *et al.* brought to our attention that our discussion about this issue in Ref. [2] gives a false impression that the Matthew effect is an example of the QKPZ class; conversely, the Matthew effect does not involve quenched disorder but induces anomalous roughening. We agree with their point and their argument about this point.

However, we would like to emphasize that the measurements presented in Ref. [2] are consistent with the QKPZ class, though they do not rule out all other models. The analysis in Ref. [1] presents an alternative interpretation of our data, noting that the results are *also* consistent with kinetic roughening, but it does not disallow the possibility of the QKPZ class. Further, as noted by Nicoli *et al.*, quenched disorder is present in the experiments. In fact, our experiments provide evidence that quenched disorder, in the form of contact line roughness, influences the growth of deposits of highly anisotropic particles.

As noted in Ref. [1], the exponents for kinetic roughening are not universal but instead can vary with system parameters. In experiments with highly anisotropic ellipsoids, we observed that the roughening exponent and growth exponent do not change with particle aspect ratio or drop size [2]. While this observation does not rule out anomalous behavior, it does suggest that the growth process is not sensitive to microscopic details in this regime.

Further, quenched disorder in the form of contact line roughness appears to influence the growth of highly anisotropic particle deposits. The drop contact line is visible (Fig. 1). The contact line is rough; this roughness is quenched in; i.e., it is set when the drop initially forms and does not change. Previous experiments (e.g., Refs. [3,4]) have demonstrated that interfacial curvature gradients can



FIG. 1. Experimental image of a deposit of ellipsoids (major-minor aspect ratio $\varepsilon = 2.5$). The contact line is highlighted. x and y directions are indicated.

direct particle motions. The curvature of the air-water interface is higher in regions where the contact line is rougher. Thus, initially, particles may prefer to deposit in regions wherein the contact line is rough and the curvature of the air-water interface is high, e.g., rather than in regions where the contact line is smooth and the curvature of the air-water interface is low.

To this end, we further investigated the correlations between local contact line roughness and the particle deposition location at early times during evaporation. The location of the contact line y is a function of lateral position x (Fig. 1). Local contact line roughness $w_{cl}(x)$ is quantified as the standard deviation of $y(x)$ over a range $x - 1.5$ to $x + 1.5$ μm (the particle diameter is 1.5 μm). w_{cl} varies laterally, with an average of $w_{cl} = 0.21$ μm . Next, we consider only locations where particles are deposited during the first 1 s of evaporation. The average of w_{cl} for 11 particles deposited during this time is $w_{cl}(\text{deposit}) = 0.31$ μm (standard error 0.05 μm). $w_{cl}(\text{deposit})/w_{cl} = 1.5$, suggesting that particles preferentially deposit in regions with higher contact line curvature. This form of quenched disorder does not appear to affect slightly stretched particles ($\varepsilon = 1.2$) or spheres ($\varepsilon = 1.0$), which have $w_{cl}(\text{deposit})/w_{cl} = 1.1$ and $w_{cl}(\text{deposit})/w_{cl} = 1.0$, respectively.

More work is required to definitively ascertain whether the QKPZ class or kinetic roughening (suggested in Ref. [1]) drives growth in deposits of highly anisotropic particles. Experimental observations in Ref. [2] are consistent with the QKPZ class, and the results presented above suggest quenched disorder is influential at early times, but these results do not rule out all other models.

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