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J. O. Marston, Y. Zhu, I. U. Vakarelski, and S. T. Thoroddsen

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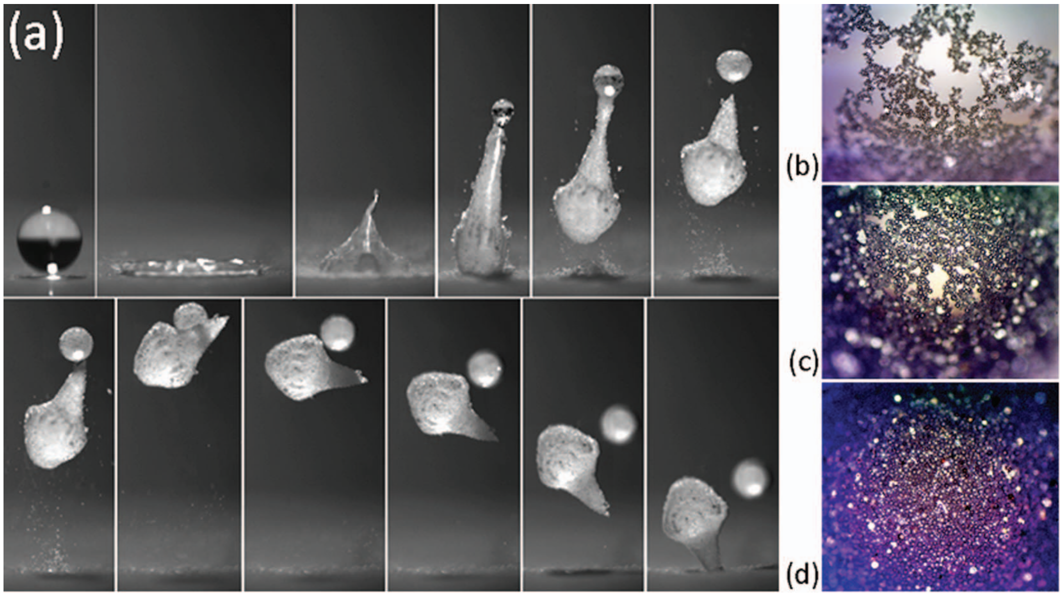

FIG. 1. (a) Impact of 2 mm drop of 25% glycerol onto a bed of fine hydrophobic glass beads (mean diameter 31 μm). The impact speed is 1.9 m/s. (b), (c), and (d) Microscope images of the surface of drops coated with powder for mobile drops (b) and (c) and a frozen drop (d) (enhanced online) [URL: http://dx.doi.org/10.1063/1.4820020.1].

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J. O. Marston,[a] Y. Zhu, I. U. Vakarelski, and S. T. Thoroddsen
Division of Physical Sciences and Engineering, King Abdullah University of Science and Technology, Thuwal 23955-6900, Saudi Arabia

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We demonstrate a curious feature of liquid drop impact onto powder beds, namely, that the oscillations that typically occur during rebound can be completely suppressed. Figure 1(a) shows this phenomenon for a 2 mm drop of 25% glycerol impacting onto a bed of fine hydrophobic glass beads (cf. Video 1). The drop spreads and attains a coating of powder which, after a satellite drop detaches, fully encapsulates the drop and prevents the drop from regaining its former spherical shape, thus "freezing" the oscillations. The pointed end indicates that surface tension is no longer acting once in this state. This is evident from the microscope images shown in Figures 1(b)–1(d) for increasing powder coverage. The drops in (b) and (c) are still mobile, whilst the drop in (d) is in the frozen state, where there is no longer a liquid free-surface. This phenomenon is repeatable for a range of liquid drop–powder grain size combinations, but only

[a]Author to whom correspondence should be addressed. Electronic mail: jeremy.marston@kaust.edu.sa

once the impact speed is above a threshold level to sufficiently deform the drop on the powder surface.[1]

[1] J. O. Marston, Y. Zhu, I. U. Vakarelski, and S. T. Thoroddsen, "Deformed liquid marbles: Freezing drop oscillations with powder," Powder Technol. **228**, 424–428 (2012).