

# Drop impact on wet granular beds: water-content effects on the cratering

Wei Zhang<sup>a</sup>, Hiroaki Katsuragi<sup>b</sup>, Ken Yamamoto<sup>\*ab</sup>

<sup>a</sup> Department of Earth and Space Science, Osaka University, 1-1 Machikaneyama, Toyonaka, Osaka 560-0043, Japan

<sup>b</sup> Water Frontier Research Center (WaTUS), Tokyo University of Science, 6-3-1 Niijuku, Katsushika-ku, Tokyo 125-8585, Japan

\* Corresponding author: yam@ess.sci.osaka-u.ac.jp

## Supplementary Information

### Information for Supplementary Movie

Supplementary Movie 1: Drop impact at  $4.0 \text{ m s}^{-1}$  on a substrate composed of  $d_g = 50 \text{ }\mu\text{m}$ ,  $w = 0 \text{ vol } \%$  (Phase 2, the same event as that in Fig. 1a). Recorded at 10000 fps.

Supplementary Movie 2: Drop impact at  $4.0 \text{ m s}^{-1}$  on a substrate composed of  $d_g = 100 \text{ }\mu\text{m}$ ,  $w = 0 \text{ vol } \%$  (Phase 3, the same event as that in Fig. 1b). Recorded at 10000 fps.

Supplementary Movie 3: Drop impact at  $4.0 \text{ m s}^{-1}$  on a substrate composed of  $d_g = 200 \text{ }\mu\text{m}$ ,  $w = 0 \text{ vol } \%$  (Phase 4, the same event as that in Fig. 1c). Recorded at 10000 fps.

Supplementary Movie 4: Drop impact at  $4.0 \text{ m s}^{-1}$  on a substrate composed of  $d_g = 400 \text{ }\mu\text{m}$ ,  $w = 0 \text{ vol } \%$  (Phase 4, the same event as that in Fig. 1d). Recorded at 10000 fps.

Supplementary Movie 5: Drop impact at  $4.0 \text{ m s}^{-1}$  on a substrate composed of  $d_g = 50 \text{ }\mu\text{m}$ ,  $w = 2.5 \text{ vol } \%$  (Phase 1, the same event as that in Fig. 1e). Recorded at 10000 fps.

Supplementary Movie 6: Drop impact at  $4.0 \text{ m s}^{-1}$  on a substrate composed of  $d_g = 100 \text{ }\mu\text{m}$ ,  $w = 2.5 \text{ vol } \%$  (Phase 2, the same event as that in Fig. 1f). Recorded at 10000 fps.

Supplementary Movie 7: Drop impact at  $4.0 \text{ m s}^{-1}$  on a substrate composed of  $d_g = 200 \text{ }\mu\text{m}$ ,  $w = 2.5 \text{ vol } \%$  (Phase 3, the same event as that in Fig. 1g). Recorded at 10000 fps.

Supplementary Movie 8: Drop impact at  $4.0 \text{ m s}^{-1}$  on a substrate composed of  $d_g = 400 \text{ }\mu\text{m}$ ,  $w = 2.5 \text{ vol } \%$  (Phase 4, the same event as that in Fig. 1h). Recorded at 10000 fps.