Supplementary Note

Glove Box Setup

The glove box (VAC 110-40/20) used for these measurements was explicitly modified to accommodate these series of experiments to ensure that we perform the tests in a dry environment much like Bennu itself. The main goal of the modifications was to reduce the quantity of adsorbed terrestrial water on the surface of the particles such that any capillary bridging was effectively negligible. Custom cable feedthroughs were created by bore-through Swage-Lok connectors fitted with Nylon ferrules and installed in the existing NPT ports. A DB-25-terminated cable was cut at one end, fed through the Swage-Lok feedthroughs, and then connected to an epoxy-potted (3M Scotch-Weld DP270) breakout board; this permitted connection between the AFM (Bruker MultiMode 8 HR) and AFM controller (Bruker Nanoscope V) by an additional DB-25 cable. USB feedthroughs were fabricated in a similar fashion to permit connection between the data-acquisition PC and the two optical microscopes used for sample manipulation and alignment. Two of each of the bored-through Swage-Lok fittings (one for the interior and one for the exterior of the glovebox main chamber) were used per cable to minimize the chance of leakage from room atmosphere into box atmosphere; the Nylon ferrules permitted the fittings to be tightened appropriately without compromising the cable insulation.

The glove box atmosphere (UHP N2, 99.999% pure, Matheson Tri Gas) was prepared by recirculating it through a vessel containing a combination of high surface area copper (as a getter for reactive species) and molecular sieve (to adsorb water vapor) and was regenerated by closing off this vessel from the main chamber and flushing 95% N2/5% H2 mix gas (Matheson Tri Gas) at an elevated temperature (to reduce the copper and purge species desorbed by the molecular solar sieve). Vacuum processes (e.g., evacuation of the antechamber or of the getter/mol-sieve during regeneration) were performed by an Edwards RV15 two-stage, oil-sealed rotary vane pump itself equipped with a molecular sieve fore line trap (to minimize the potential for oil back-streaming during the measurement process). Polymer sealing surfaces were coated with Dow Corning high-vacuum grease where appropriate (e.g., during the fitting of the main chamber window). The quality of the atmosphere was monitored before and during the experiment by a Dwyer hygrometer.

Supplementary Table

DOI – Bennu	
10.60707/2atn-2650	10.60707/xke8-rc57
10.60707/4t29-9t78	10.60707/t4fe-t787
10.60707/bbt2-9085	10.60707/mt26-pt91
10.60707/da75-br85	10.60707/sa6q-mf36
10.60707/gjg3-n269	10.60707/hz86-xg53
DOI - Meteorites	
TBD	

Supplementary Table 1. DOIs AFM particle–particle cohesion measurement datasets for Bennu samples and meteorites used in this study**.**