Fig. S1. Raw FORCs and Difference FORCs corresponding to Fig. 1 (quasi static SW randomly packed uniaxial).
Fig. S2. FORC diagram obtained for $p = 0.05$ using a fully static interaction field. Note the elliptical, rather than teardrop shape of the FORC diagram.
Fig. S3. FORC diagram obtained for $p = 0.15$ using a quasi-static interaction field. Note the unphysical FORC diagram and oscillatory nature of the magnetisation curves, indicating that this approach is not valid for this packing fraction.
Fig. S4. Raw FORCs and Difference FORCs corresponding to Fig. 2. LLG random uniaxial.
Fig. S5. Raw FORCs and Difference FORCs corresponding to Fig. 5. LLG random cubic.
Fig. S6. Raw FORCs and Difference FORCs corresponding to Fig. 8. Chain collapse.

(a) $c = 0$
(b) $c = 0$
(c) $c = 0.3$
(d) $c = 0.3$
(e) $c = 0.7$
(f) $c = 0.7$
(g) $c = 1$
(h) $c = 1$
Fig. S7. Raw FORCs and Difference FORCs corresponding to Fig. 8. Inter-particle separation.
Fig. S8. Raw FORCs and Difference FORCs corresponding to Fig. 9. (a-b) Fire obsidian, (c-d) Brownie Lake bacterial, (e-f) Olivine with magnetite-decorated dislocations.