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Shape transitions in soft spheres regulated by elasticity CRAIG FOGLE, Department of Physics, UCLA, AMY ROWAT, Department of Integrative Biology and Physiology, UCLA, ALEX LEVINE, JOSEPH RUDNICK, Department of Physics, UCLA — Soft core shell structures abound in nature. Examples of these structures, comprised of a thin outer membrane bounding an elastic core, include raisins, gel-filled vesicles, and a variety of membrane-bound organelles in the cell. We study the elasticity-driven morphological transitions of spherical core shell structures when either their surface area is increased or their interior volume is decreased. We demonstrate a transition, which is related to the Euler buckling, from the spherical initial shape to a lower symmetry one. We discuss the dependence of the critical excess surface area (relative to that of a bounding sphere) for buckling, the internal stresses in the core, and the symmetry of the buckled state on the elastic parameters of the system. We compare these predictions to a variety of observed morphological transitions in hard and soft materials, and discuss extensions of this work to growing viscoelastic media.

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