This is a proposal to study the revolutionary concept of applying self-assembly to the manufacture of optical telescopes in space or on the surface of planetary bodies such as the Moon or Mars. The project plan takes advantage of the expertise of the two team members: one knowledgeable in space optics and space systems, and the other knowledgeable in the area of self-assembly based on both biological and non-biological origins. We will evaluate the feasibility of the concept and design experiments and further study to be carried out in Phase II which will, upon successful completion, lead to the design of a proof-of-concept mission.