STARSHADE TECHNOLOGY DEVELOPMENT TO TRL 5 (S5) — AN EXOPLANET EXPLORATION PROGRAM TECHNOLOGY ACTIVITY. K. Short[1], P. Willems[1], S. Shaklan[1], S. Martin[1], D. Webb[1], D. Lisman[1], T. Flinois[1], M. Bottom[1], [1]Jet Propulsion Laboratory.

Introduction: A key method in the pursuit of NASA's goals and objectives for the "search for life on planets around other stars"1 is the direct imaging of planets around other stars. Directly sampling the light from an exoplanet separately from that of its host star facilitates measurement of its size, orbit, albedo, and ground and atmospheric spectra, which provide clues to its habitability, and potentially could provide signatures of the presence of life itself. However, direct observation of small, rocky planets like Earth close enough to their host stars to harbor liquid water is very difficult due to the extreme faintness of the exoplanet relative to the very nearby star. The starlight must be suppressed, either interferometrically or by an occulter, to allow exoplanet detection. Occulters that are internal to the telescope are referred to as coronagraphs. Occulters that are external to the telescope are referred to as starshades. In 2018, NASA's Astrophysics Division approved a focused activity to bring starshade technology to Technical Readiness Level 5 (TRL5). This focused activity is called S5. This poster contains the details of all elements in the S5 Technology Development Plan (TDP)[2]. The elements of technology advancements for starshades are derived from the ExEP 2018 Technology Plan Appendix which lists five technologies within three technology gaps that must be advanced in order bring the starshade to TRL5.2 These gaps are in the areas of starlight suppression, mechanical shape stability and deployment accuracy, and formation flying between the starshade and telescope. The goal of S5 is to bring a system with all these technologies to TRL5.

References:

[1] 2014 NASA Strategic Plan, p. iii and p. 21.
[2] Willems, P. (2018) S5 Starshade to TRL5 (S5) Technology Development Plan

[1] 2014 NASA Strategic Plan, p. iii and p. 21.
[2] Exoplanet Exploration Program 2018 Technology Plan Appendix, section C.