



Electronic Life-detection Instrument for Enceladus/Europa (ELIE)

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Target: Enceladus/Europa plume sampling, lander, sub-surface explorer; Mars; prebiotic environments (Titan, other Ocean Worlds)

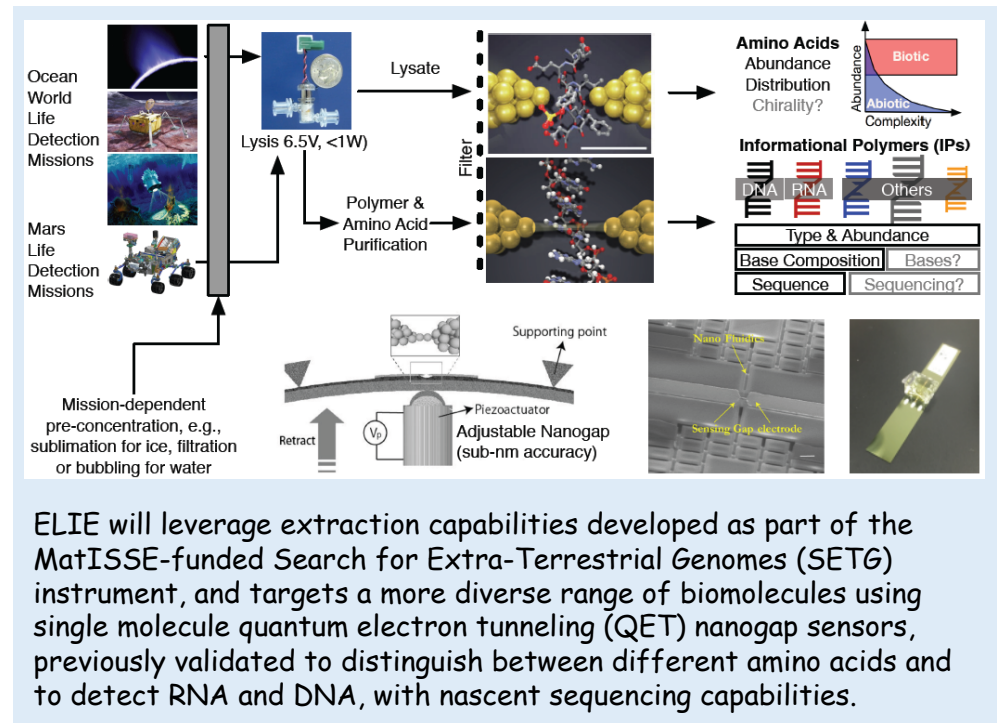
Science:

- Single molecule detection and discrimination of amino acids, distribution of amino acids relative to biotic or abiotic expectations.
- Single molecule detection of RNA, DNA, and other linear charged informational polymers (IPs) including non-standard bases/polymers
- Sequencing of nucleic acids for detection of forward contamination or ancestral relationship

Objectives:

- Validate single molecule discrimination of pure biomolecules (amino acids, nucleic acids)
- Extend discrimination to biomolecular mixtures using protocell and microbial models of increasing fidelity (Ocean World analogs)
- Develop breadboard system and advancement plan to achieve TRL-6 by PDR of Enceladus Plume fly through, Europa Lander, or other relevant Ocean Worlds mission.

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Key Milestones:

- Amino acid detection, discrimination, and distribution measurement at single molecule level (year 1)
- Informational polymer (IP) type, base composition, and limited sequencing of RNA, DNA (year 1)
- Discriminate between biomolecule types in mixtures and initial testing using model samples (year 2)
- Develop and validate breadboard with target of 10 ppt sensitivity (year 3)

TRL 2 to 4