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Microfluidic Chromatography for Amino Acid Purification

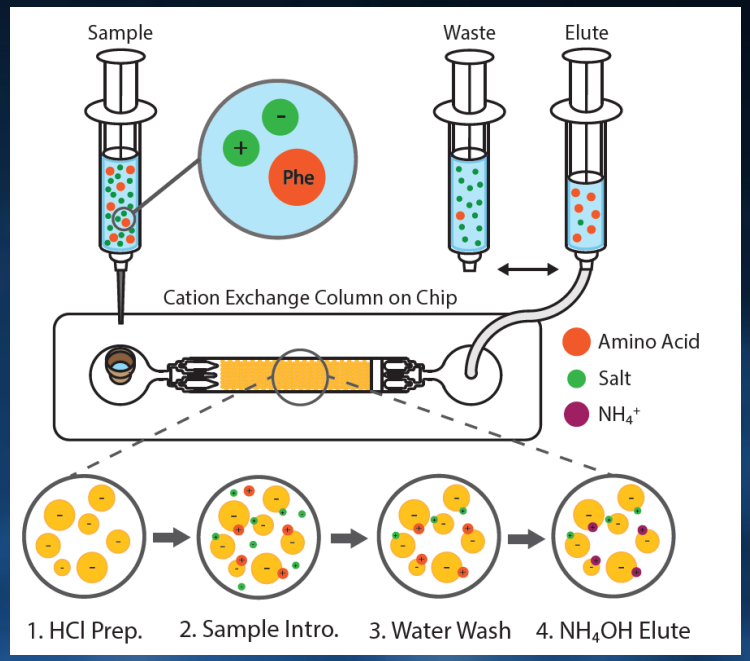
Purification procedure:

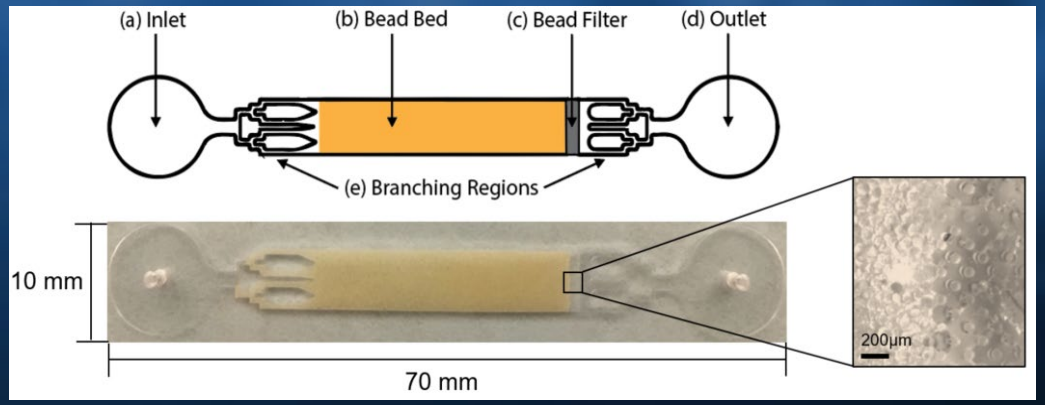
1) Acid gives resin (-) charge,

2) (+) charged AAs bind,

3) water removes salts

4) AAs eluted with base





Microfluidic prototype device with: a) inlet, b) resin bed, c) bead filter, d) outlet

For Ocean Worlds, amino acids (AAs) are expected to be dilute (ppb/ppt levels) and in confounding matrices (i.e., salts and very acidic) that can make detection very challenging. We have built a microfluidic cation exchange resin device to both desalt and concentrate amino acids *in situ*.

- Demonstrated separation in concentrated Europan analog salt solutions (NaCl, $CaCl_2$, and $MgSO_4$) at ion to AA molar ratios of 500:1
- Identified that the AA side chain chemistry is the most important factor for predicting the purified yield in solution, and demonstrated concentration of the best performing AAs
- Could be integrated upstream of current AA detection modules (i.e. GC/MS, CE-LIF) to improve AA detectability *in situ*.

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