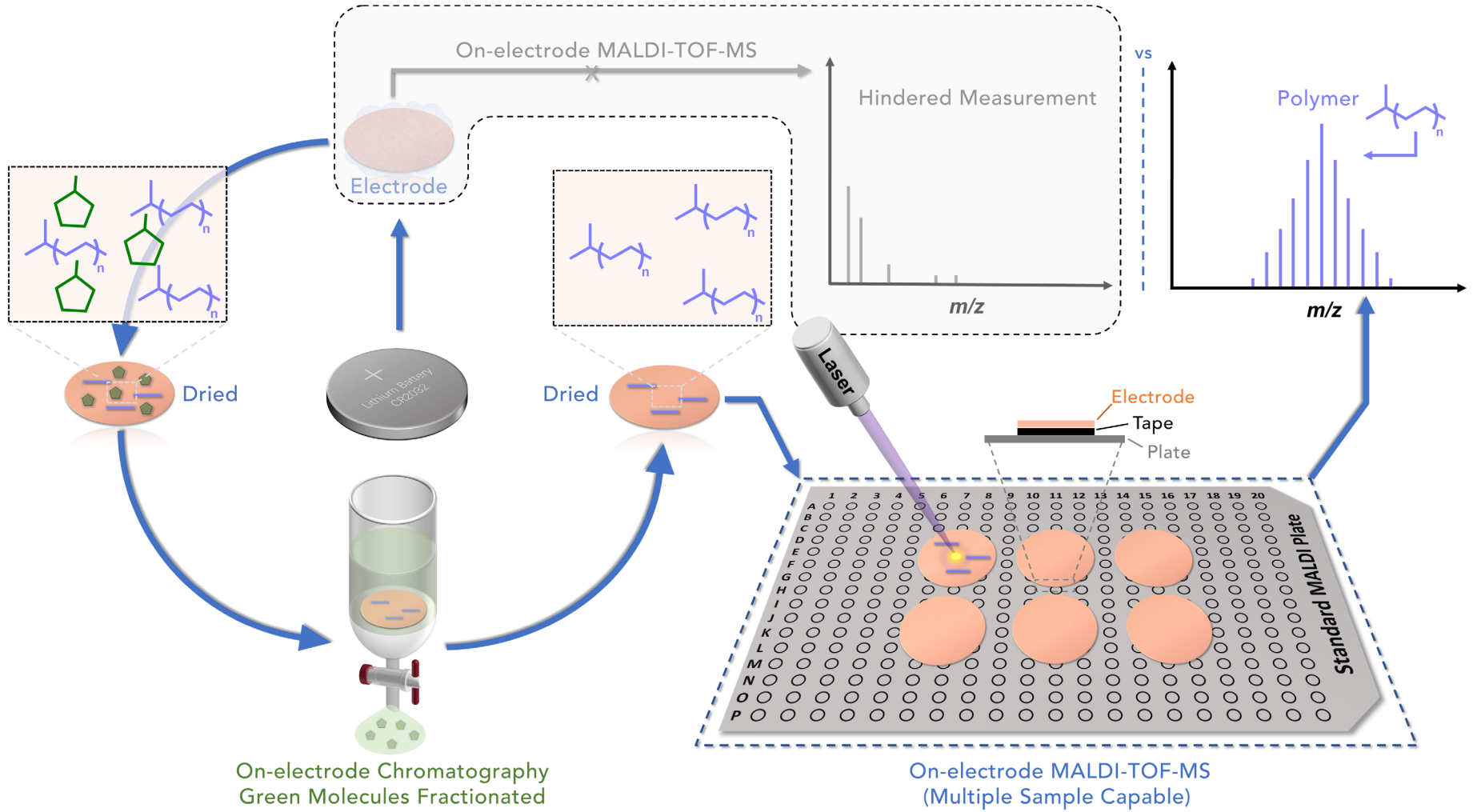
Part I. Identification of large-molecule SEI components with on-electrode chromatography and MALDI techniques



MALDI measurement of electrodes could be easily hindered by the complicated chemical environment on the electrode surfaces. Through proper solvent elution (left part of the figure) to fractionate different molecular species on electrode surfaces (such as ethylene carbonate, the green molecules), on-electrode chromatography can realize separation of the organic SEI components. This approach facilitates the MALDI detection of the organic electrolyte decomposition products in SEIs (right part of the figure), especially the high-mass polymeric species (the blue molecules). Multiple elution conditions could be employed to separate and to distinguish different SEI components. The MALDI measurement is carried out with conventional MALDI instrumentation.

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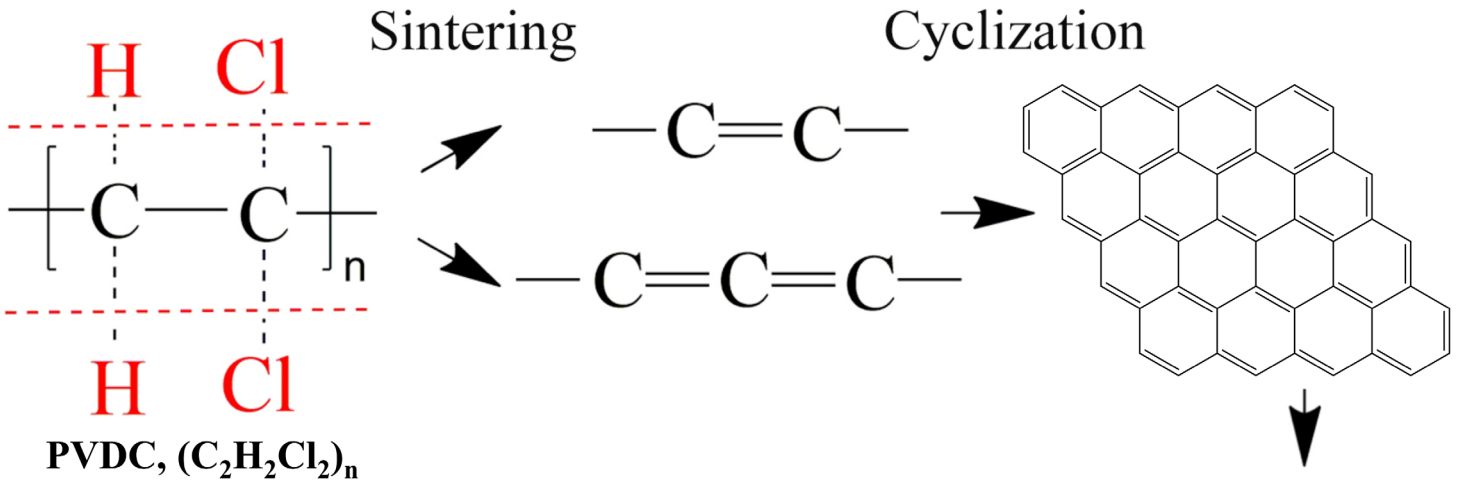
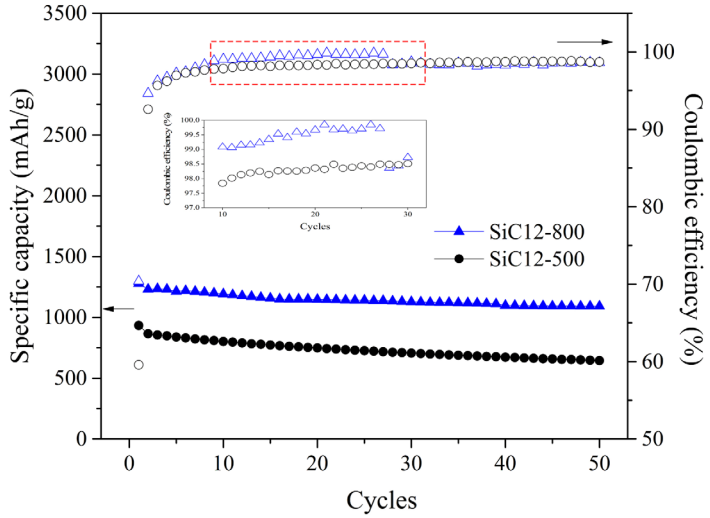
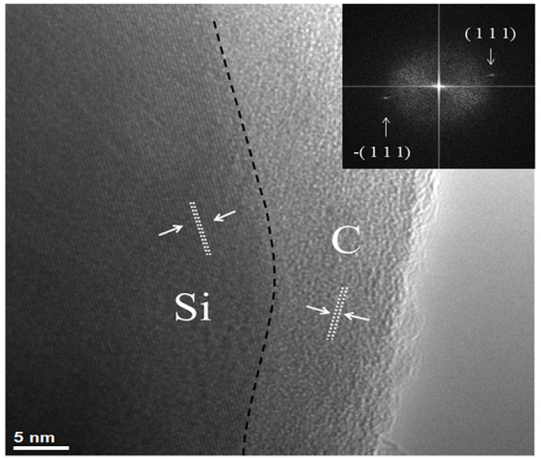
Part II. Carbon coating prepared with polyvinylidene chloride (PVDC) precursor for silicon anodes applications







Polyvinylidene chloride (PVDC) contains stoichiometric ratio of H and Cl atoms, thus capable of generating ordered carbon coatings for encapsulating silicon nanoparticles upon pyrolysis. The ordered carbon coating can serve to accommodate silicon volume expansion and to maintain the conductivity as well as the chemical stability of the network.

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