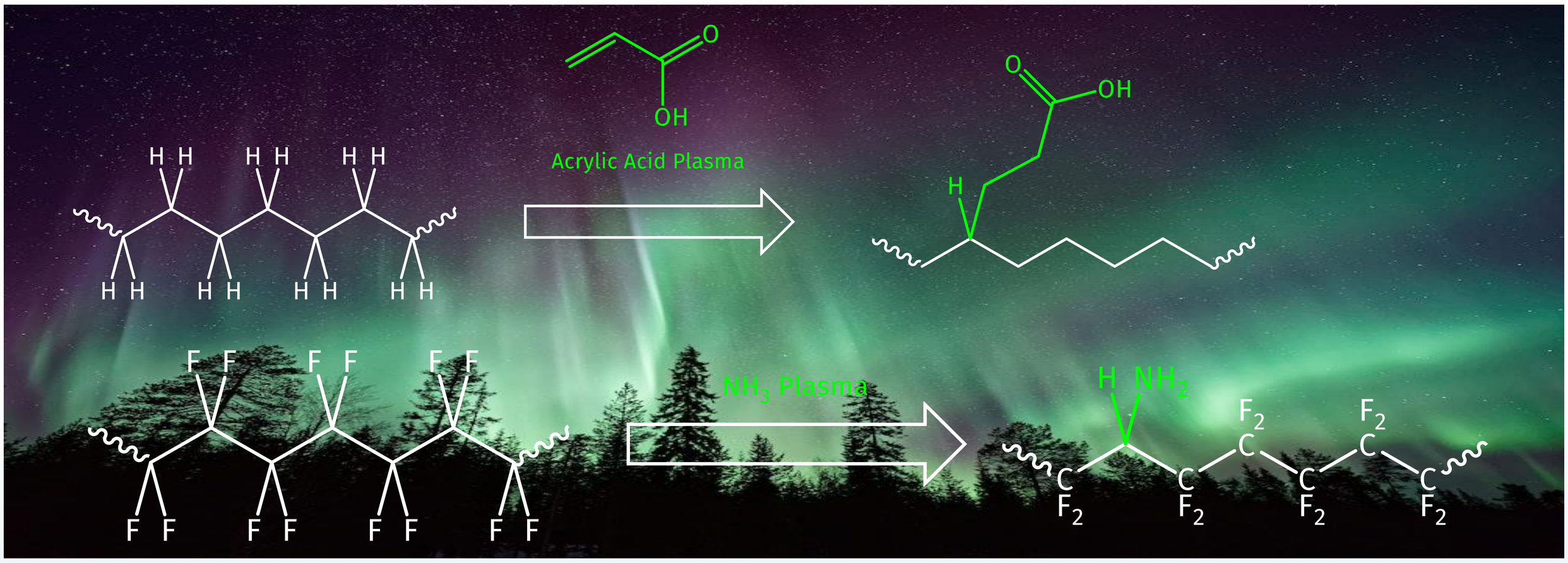
Linkerology®

2023 # 03 – Surface Treatment for Linker Attachment

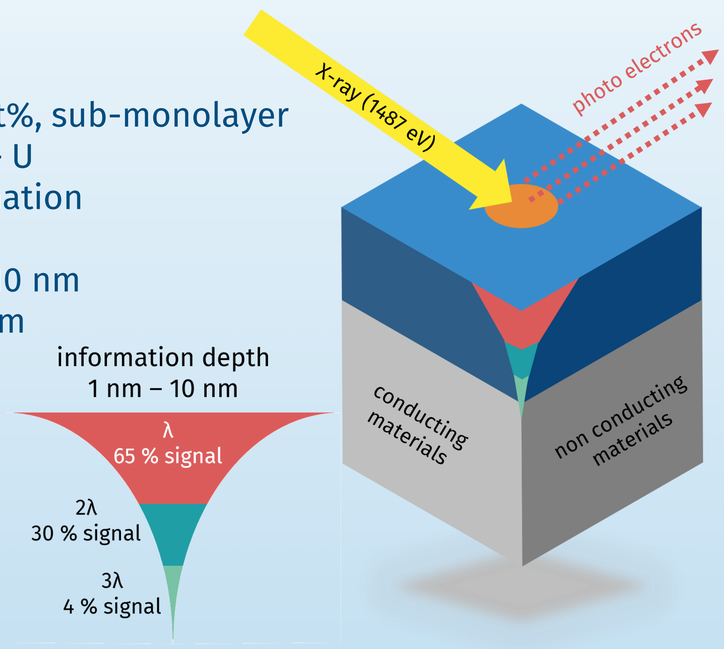
Examples How Plastic Polymer Surfaces Can Be Decorated With (Self-Immolative) Linkers

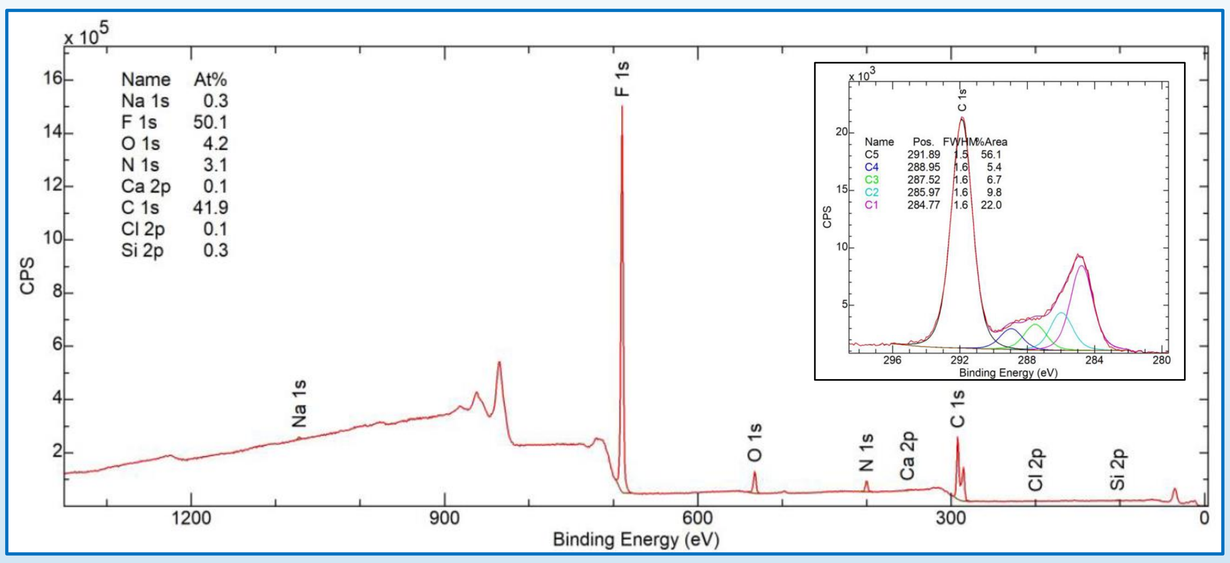


- Polymers (polyethylene, polystyrene, teflon, latex)
- Treated with plasma (NH_3 or acrylic acid)
- Analysis *via* XPS

<u>Information:</u>

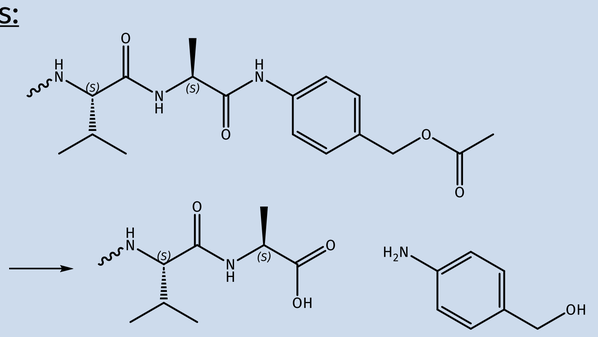
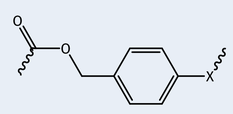
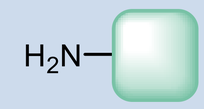
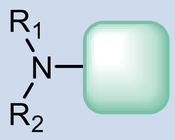
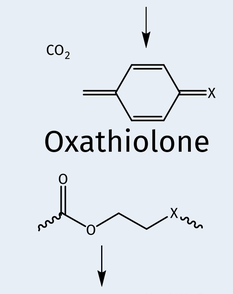
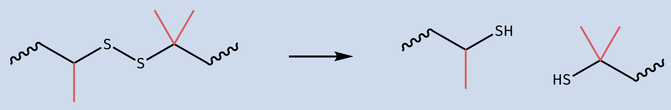
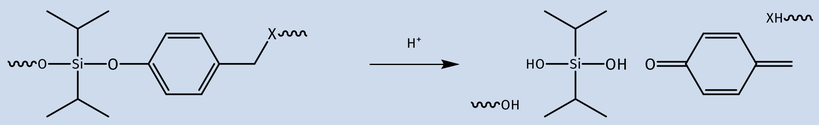
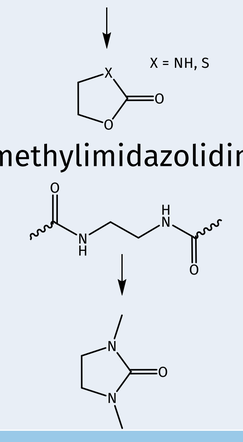
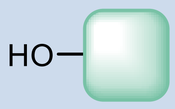
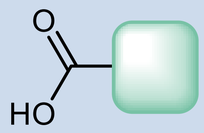
- Detection limit: 0.01 - 1 at%, sub-monolayer
- Detectable elements: Li – U
- Chemical bonding information
- Quantitative information
- Information depth: ~ 2 - 10 nm
- Lateral resolution: ~ 30 µm
- Depth Profiling
- Imaging/Mapping





Surface analytics by **XPS** provides quantitative information about elemental composition within 2 nm to 10 nm; deconvolution of high-resolution spectra delivers information about oxidation and binding state.
Determination of all elements except H and He: C/F/O/Si/N/P/Na/Ca/S etc.
C-C/C-H vs. C-O vs. C=O vs. COOR vs. CF_3. F: covalent vs. ionic.

Linkerology® - Conceptual Overview

Carrier	Surface Treatment & Conjugation Chemistry	Cleavage	Fragmentation	Functionality of Natural Product
Metal surface	Affinity of sulfur to gold and silver	<u>Enzymatic hydrolysis:</u> • Val-Ala • Val-Cit • Phe-Lys • Gly-Phe-Leu-Gly • Ala-Leu-Ala-Leu • Cyclobutyl-Ala • Cyclobutyl-Cit • Glucuronic acid 	*p*-Aminobenzyl *p*-Hydroxybenzyl 	Primary & secondary amines 
Metal oxide	Chelat formation			
Silicates	Affinity of silicon and oxygen			
<u>Carbon:</u> • Nanotubes • Fullerenes	Nitrenen addition via photoactivation of perfluoroarylazides			Tertiary amines 
<u>Plastic polymers:</u> • Teflon • Polyethylene • Polystyrene • Latex	Ammonia or acrylic acid plasma followed by amide bond formation		Oxathiolone 	
<u>Biopolymers:</u> • Peptides • Proteins • Antibodies • Single Chain • Nanobodies • Camelides • Oligonucleotides • Aptamers	Thioether formation with maleimide Disulfide bond formation Acylation of Amines His-Tag acylation Click conjugation (CuCAAC, SPAAC, IEDDA) Enzyme supported conjugation: HaloTag® CLIP-Tag™ SNAP-Tag® Sequence dependent conjugation (Sortase)	Reduction  Acidic hydrolysis 	 Dimethylimidazolidinone	Alcohols Phenols  Carboxylic acids 

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