AUSTIN
MARKETING A WORLD OF FINE CHEMICALS™

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SiKÉMIA
materials surface functionalization

Surface Functionalization: The Best Linkers

SiKÉMIA
Place Eugène Bataillon, cc1701
34095 Montpellier, FRANCE, FR

Chemical Process:

Easy to operate
Low cost : 1mg for 1m² of functionalized surface
Lasting and **Transparent** coating

Immersion Spray Grind

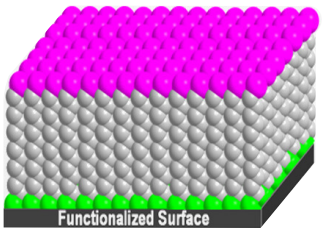
Brings New Property to the Surface

- **Physical Properties :** Tribological, Electronical, Surface Energy, etc.
- **Chemical Properties :** Reactivity, Surface Charge, etc.
- **Applications:** Primer, Bio-Immobilisation, Hydrophobation, Lubrication, Self-cleaning, Epilam, etc.

Bifunctional Molecule :

Terminal Function
Anchoring Function

SAMs
1–2.5 nm



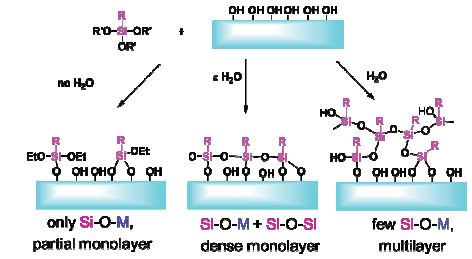
Covalent Binding to the Surface

Nature of Surface ⟷ Nature of Linker

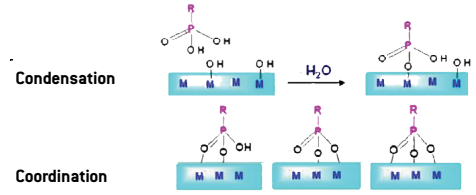
Specific Conditions

No Specific Conditions

Organosilanes : R-SiX$_3$

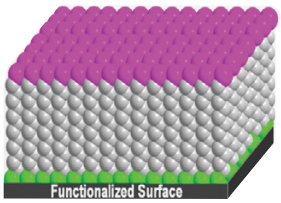


Organophosphorus : R-P=O(OH)$_2$

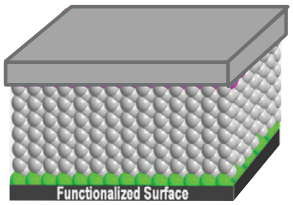


Self Assembled Monolayers

- Need of smaller **quantity**
- **Homogeneous** Surface Property
- **Accessibility** of Terminal Group



Final Coating



Interface Modification

Main characteristics	Phosphonic Acids	Silanes	Thiols	Carboxylic Acids
Bonding to the Surface	✓ M-O-P (Up to 3)	✓ M-O-Si (Up to 3)	✓ M-S (Only 1)	✓ M-O-C (Up to 2)
Linker Stability (H_2O/O_2)	✓	✗	✗	✓
Controlled Monolayer	✓✓	✗	✓✓	✓
Polycondensation	✗	✓	✗	✗
Surfaces: Silica	✗	✓✓	✗	✗
Surfaces: Metal Oxide	✓✓	✓	✗	✓
Surfaces: Metal	✓✓	✗	✗	✓
Surfaces: Coinage Metal	✓	✗	✓✓	✗
Surfaces: Carbonate	✓	✗	✗	✓

Primer Coating

APPLICATIONS
- Improve Paint Adhesion
- Bio-Immobilisation
- Interface Modification

ADVANTAGES
- Short, Easy and Metal Free Process
- Soluble in Water

Omniphobic Coating

APPLICATIONS
- Epilam
- Self Cleaning Property
- Fingerprint Stop

ADVANTAGES
- Durability (covalent bonding)
- Transparent Coating

Powder Dispersibility Coating

APPLICATIONS
- Limitation of Reagregation
- Phase Transfer of nanoparticles

ADVANTAGES
- Solvant Free process
- Improving Formulation

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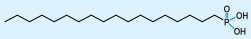
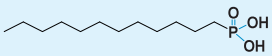
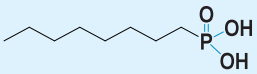
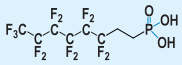
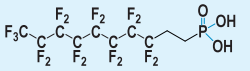
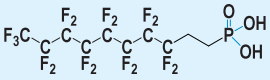
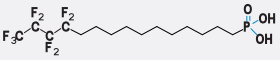
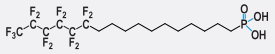
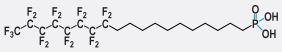
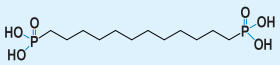
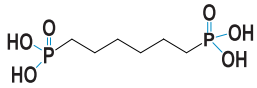
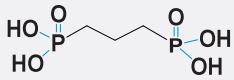
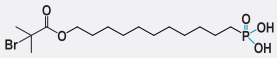
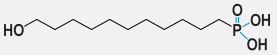
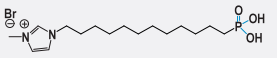
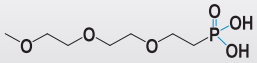
PROPERTY	STRUCTURE	NAME
Lubricant Solution		n-Octadecylphosphonic acid
		n-Dodecylphosphonic acid
		n-Octylphosphonic acid
Omniphobic Solution		3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooctylphosphonic acid
		3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-Heptadecafluorodecylphosphonic acid
		3,3,4,4,5,5,6,6-Nonafluorohexylphosphonic acid
		12,12,13,13,14,14,15,15,15- Nonafluoropentadecyl phosphonic acid
		12,12,13,13,14,14,15,15,16,16,17,17-Tridecafluoroseptadecylphosphonic acid
		12,12,13,13,14,14,15,15,16,16,17,17,18,18,19,19,19- Heptadecafluorononadecylphosphonic acid
Primer		(12-Phosphonododecyl)phosphonic acid
		(6-Phosphonohexyl)phosphonic acid
		Propylenediphosphonic acid

PROPERTY	STRUCTURE	NAME
Polimerization Initiator		11- (2- Bromoisobutyrate) - undecyl- 1- phosphonic acid
Bio-Immobilisation		11-Hydroxyundecylphosphonic acid
		1-Methyl-3-(dodecylphosphonic acid)imidazolium bromide
Dispersant Solution		(2-{2-[2-Methoxy-ethoxy]-ethoxy}-ethyl)phosphonic acid