A new generation of omniphobic surfaces: ionogel-based coatings

CIDETEC has developed a disruptive family of coatings, based on innovative ionogels, that exhibit omniphobic functionality since they are able to repel not only water, oil and organic solvents, but also other species such as greases, ketchup and mustard.

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“Coatings having repellent function and use thereof”

Concept

By combining a covalently anchored cross-linked polymer coating and non-volatile lubricants in an appropriate manner, a single-phase ionogel coating can be formed. The physico-chemical properties and functionality of the resulting coating can be adjusted by adding tailored functional groups to both building blocks (i.e. cross-linked polymer and lubricant). In particular, wettability of these versatile coatings may be tailored, reaching high repellency to fluids (i.e. omniphobicity).

SLIPS vs. superhydrophobic

Enhanced fluid slippery (i.e. even at modest contact angles). No absolute need of hierarchical morphologies => wide room for transparency and enhanced robustness.

CIDETEC’s omniphobic ionogel coatings vs. SLIPS

SLIPS limitations:
- Weak bonding to the substrate.
- Loss of lubricant (e.g. evaporation...).
- Mechanical robustness of the nanostructure (needed for high contact angles).

CIDETEC’s omniphobic ionogel coatings*:
- Covalent bonding to the substrate.
- Cross-linked polymers.
- Non volatile lubricants.
- Single phase (i.e. ionogel) coatings.
- Wide versatility for customization.

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Biomimetic fluid-repellent surfaces

Superhydrophobic
Hierarchical surfaces
- Lotus leaf-like.
- Hierarchical morphology.
- Hydrophobic functionality.

Omniphobic
Slippery Liquid infused Porous Surfaces (SLIPS)
- Nepenthes-like.
- Nanostructured surfaces retaining a liquid lubricant, which repels other fluids.
- Omniphobic functionality.

Opportunities

The omniphobic effect can be achieved on a wide range of materials: glass, metals, ceramics, polymers, papers...providing straightforward self-cleaning, anti-soiling and anti-icing solutions for different applications and sectors such as automotive, oil&gas, marine, buildings, packaging, paper industry.

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