Novel Photoreactive Primer for Silicone Surfaces

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Innovative Surface Technologies, Inc.

Biointerface 2010
Biomedical Applications of Silicone Rubber

- Bioinertness
- Blood compatibility
- Flexibility
- Durability
- Thermal stability

Silicone Rubber

- Catheters
- Artificial skin
- Pacemaker leads
- Contact lenses
- Denture liners
- Blood pumps
- CSF shunts
- Drug delivery systems
- Medical adhesives
- Finger joints
Surface Modification of Silicone Rubber

Hard to coat — poor adhesion/wettability

- Low surface energy
- Lack of reactive surface groups
- Relative high amount of low-molecular-weight components

Current approaches — physical and chemical

- Plasma, corona, laser
- Surface grafting
- Chemical vapor deposition
Design of Photoreactive Silicone Primer

PhotoPrime™

Solubility factor
Linkage
Silicone affinity group
Photoreactive group
Coating Characterization

Confocal Raman microscopy

SEM

Top coat staining
Hydrophilic and Superhydrophobic Topcoat

Durability

Stability

Friction test on silicone catheters coated with PhotoPrime™ formulation followed by ISurTec hydrophilic coating.

Superhydrophobic coating was applied 40 days post primer coating. A) superhydrophobic coating applied on unprimed catheter does not show superhydrophobic effect in water; B) superhydrophobic coating applied on primed catheter does not wet and retains a layer of trapped air.
Cytotoxicity of PhotoPrime™

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ISurTec®
Cytotoxicity of PhotoPrime™

HeLa

Control

PhotoPrime™

BAEC

Control

PhotoPrime™
Photo-patterning

UV

Mask

Silicone

1 mm
Conclusion

- PhotoPrime™ coating has high affinity for silicone that provides a permanent modification to silicone surfaces.
- PhotoPrime™ treatment provides a durable intermediate surface to which other coatings, which do not readily adhere to silicone surfaces, can be applied and covalently bonded.
- PhotoPrime™ formulation uses safe solvents and the coating is noncytotoxic.
- PhotoPrime™ application is simple, flexible and patternable.
- Desired surface properties (such as lubricity, drug delivery, biomolecule activity) can be achieved on silicone rubber devices.
Acknowledgement

http://www.isurtec.com