

Advancement of Super-hydrophilic nanopillar-structured quartz surface to inhibit biofilm appropriate to optical devices

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Bacterial infections are common in organisms and frequently lead to outbreaks of diseases. Bacteria also form biofilms which can increase resistance to antibiotics. Bacteria biofilms are associated with infections of optical devices. Infections through optical devices (i.e. contact lenses, optical glasses, etc.) potentially may lead to multiple infections. In our work, we made transparent super-hydrophilic surfaces by producing nanopillars structure on a quartz surface through the etching method. Etching refers to the process of chemically or physically removing unnecessary parts on the surface to obtain the desired shape. We used both dry etching and wet etching to fabricate nanopillars structure on a quartz surface. Then we checked its bactericidal properties with gram-negative bacterial species. Besides, we have concentrated on optical properties of the surfaces: anti-fogging and anti-reflective properties reasonable for optical devices. Our results exhibit that the multi-usefulness of nanopillar-structured surfaces, including bactericidal, super-hydrophilic, anti-fogging, and anti-reflection properties, could give clear preferences to optical bio-medical devices.