Durable Polymeric Antimicrobial Coating for Orthopedics

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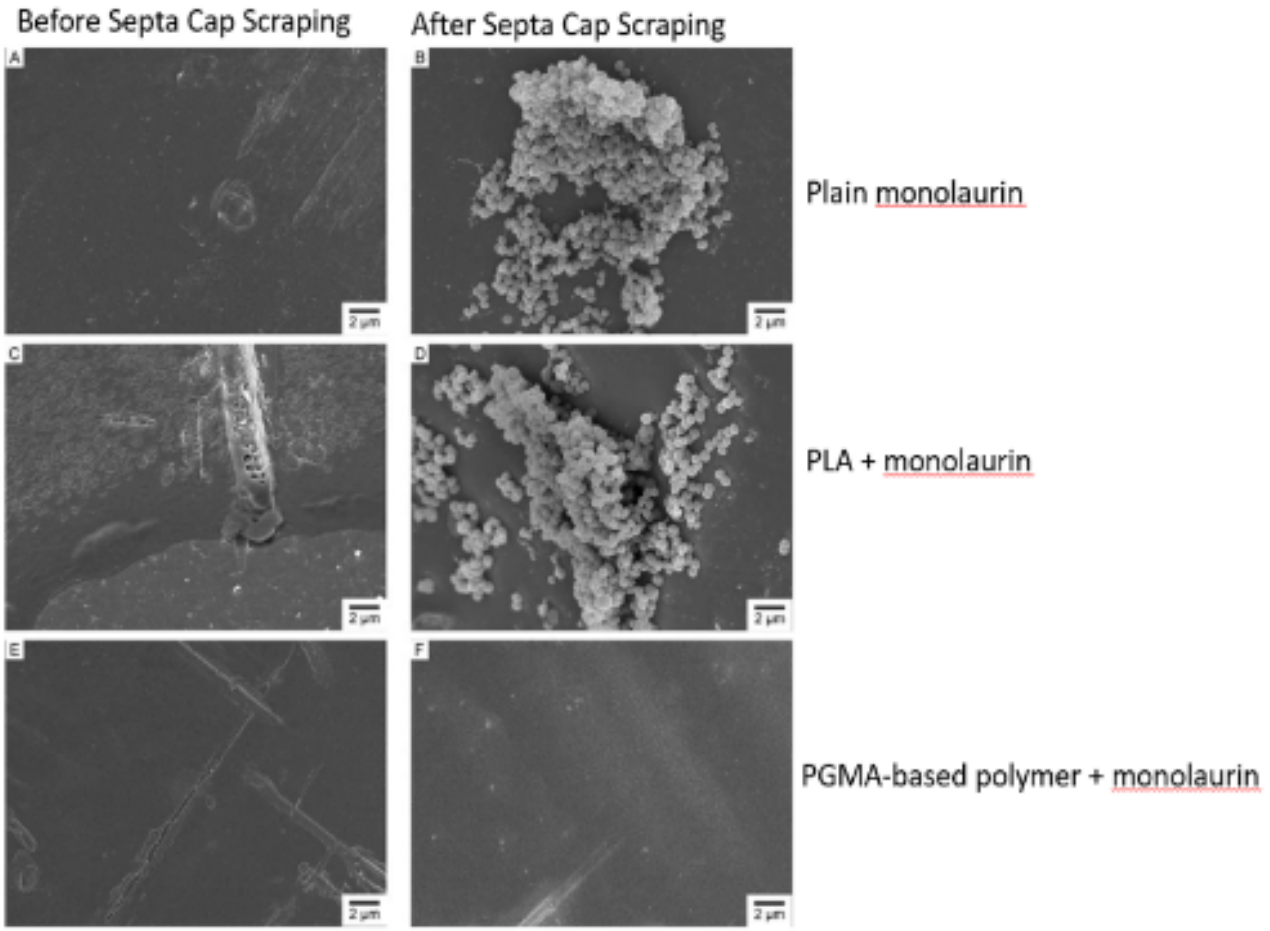
Technology description

This highly-adherent polyglycidyl methacrylate-based (PGMA) coating for external fixator hardware resists mechanical shearing and degradation over time, allowing for consistent dispersion of antibiotics at the implant site. The coating consists of a co-polymer of up to three polymers: PGMA, which is responsible for high adhesion to metal, polyoligoethyleneglycol methacrylate (POEGMA), which forms domains for incorporation of hydrophilic drugs, and polylauryl methacrylate (PLMA), which forms domains for incorporation of hydrophobic drugs. Both hydrophilic and hydrophobic drugs can be incorporated into PGMA-based films in much higher doses than during a simple drug adsorption. Use of PGMA-based coating allowed for prolonged drug release and increased the drug’ s long-term storage stability. Such PGMA-based coatings remain stable on metal implants after application of considerable shear forces, which enables incorporation and sustained release for broad range of drugs, including antibiotics, anti-inflammatory drugs, growth factors, and many others. In vitro pre-clinical studies have been completed.



Overview:External fixation is a well-established orthopedic practice in which fractured bones or fusion sites are immobilized for healing by placing wires and/or pins into the bone on either side. Unfortunately, both superficial and deep tissue infections are prevalent with the use of external fixators, particularly staphylococcal infections. The economic burden caused by treating such infections is expected to reach $1.6B annually by 2020. Though other antimicrobial coatings have been developed for use in orthopedics, the process required to insert the hardware into the patient exerts a tremendous shearing force, compromising the stability, longevity and efficacy of the product coating. Clemson researchers have engineered a mechanically-stable antibiotic coating that withstands insertion to disperse a consistent antibiotic dosage throughout the lifespan of the implant.

Application area

Antimicrobial coating for orthopedics

Advantages

• Coating maintains mechanical stability through insertion process, ensuring product safety
• Can be copolymerized with other monomers, allowing for fine-tuning of chemical and physical properties.
• Epoxy remains stable under neutral pH conditions, dispersing antibiotic only after insertion

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