Toward the Development of Novel Nitric Oxide Donating Polymeric Materials to Improve the Biocompatibility of Implanted Devices

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Previous studies have shown that many S-nitrosothiols (RSNOs) rapidly degrade, with half-lives from minutes to seconds in aqueous solution [1]. The research presented in this paper presents data that the RSNO 1,3-benzenedinitrosothiol has been relatively stable for over 1 year. This RSNO still releases nitric oxide (NO) when subjected to ultraviolet light and has the same characteristic absorbance peak as a freshly made RSNO. Developing this stable RSNO potentially provides a venue for further investigation into using this NO donor to improve the biocompatibility of implanted optical sensors.

Emergency Cardiac Anterolateral Thoracotomy Simulator

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Trauma is the leading cause of death in persons younger than 44 years old in America; half of the deaths occur within the first hour following the incident. The likelihood of survival for such critical trauma patients is significantly increased if an Emergency Department Thoracotomy (EDT) is performed. EDT entails the surgeon performing large and rapid incisions into the pleural space of the thoracic cavity to resuscitate patients who have suffered penetrating chest trauma. This procedure is highly invasive and rare and is typically conducted outside the operating theater in the absence of a trained cardiothoracic surgeon. Since most emergency clinicians are not trained to perform EDT and are often hesitant to perform it, poor outcomes are common. The use of clinical simulators offers the potential to eliminate these concerns; however, current medical simulators are not dedicated to the training of EDT. The goal of this work was to design and build a mechanical simulator to mimic the functionality of the rib cage and the components within the thoracic cavity to serve as a learning and assessment tool for conducting EDT. This design paper presents the user requirements and engineering specifications for the simulator, explains the materials selection approach employed for the thoracic components, and describes the iterative approach for designing, fabricating, and validating the EDT simulator.