Novel Agarose Processing Techniques: Design and Characterization of a Sturdy, Porous Foam for Controlled Topical Drug Delivery

Jhaveri, Hamzah (School: Lake Highland Preparatory School)

Rapidly emergent within the scientific community are drug delivery systems, complex amalgamations of medicinals consolidated into a controllable vehicle that seeks to maximize immediacy and efficiency of medical relief. The field of hydrogel drying holds much promise for such a vehicle. This research aimed to design a sturdy agarose foam as a system for controlled topical drug delivery. The first phase of research was dedicated to developing a fundamental processing technique for constructing foam: this was desiccating an agitated agar gel preform in vacuum. Then, the foam's physical characteristics were analyzed. Finally, the foam was impregnated in two phases. In the first phase, the foam was doped with an aesthetic dopant to demonstrate the foam's conformity of appearance. In the second phase, a dopant, fluorescein, was released from the foam at controllable rates into deionized water. A novel, light, organic, porous foam was successfully produced and characterized. The visual dopant displayed the foam's conformity of appearance, while the controlled release of fluorescein basally modeled the foam's targeted application as a medicinal delivery system geared towards recovery from exhaustive violence, such as after terrorist attacks or combat situations. Preliminary bacterial testing has been initiated to assess antibacterial release from foam samples and efficacy on bacterial cultures. Alternative applications of the foam extend into the field of environmental engineering, demonstrating its versatile potentials.

Awards Won:
American Chemical Society: Certificate of Honorable Mention