Novel Agarose Processing Techniques: Development and Impregnation of Hyper-Porous Agarose Emission Foam and Micro-Cylindrical Agarose Particles

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A nuanced and advantageous polysaccharide derived from red algae, agarose has myriad benefits, including its enormous bioavailability, its organic composure and its water solubility. When dissolved in water at a warm temperature, then cooled, the agarose solution forms a highly useful semi-sturdy gel. However, the scientific community has done little to advance agarose's presentation and application beyond this form. Developing and impregnating a macroscopic hyper-porous agarose foam and micro-cylindrical agarose particles augments agarose's plethora of applications. The foam was developed by stirring an agarose solution and dissociating bonds during agarose's cooling and gelation process. The preform was then desiccated in a vacuum oven, inducing interior pore formation, distinguishing the substance as a foam. Impregnating the foam with fluorescein and recording the successful release of such a dopant mimicked potential medicinal dopants, while impregnating the foam with the more aesthetic, yet equally pragmatic thermochromic pigments displayed topical dopant capabilities. The micro-cylindrical agarose particles were developed using fiber-optics procedure known as Cold Drawing: by inducing tensile stress on the interior rod, or core, of a fiber, uniform cylindrical fragmentation can be achieved. The agarose solution was prepared using turgidity-increasing enhancers, then was manually injected into the core of a poly-ethylene sulfurn (PES) fiber. The liquid core was left to cool and gelate before being manually stretched to successfully induce uniform particle formation. Both processing techniques hold potential for application in biomedical, bioremediative and environmental fields and their successful production implicates an expansive future for agarose.

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