

Sol-Gel Coated Fabric for Controlled Release of Mosquito Repellent

Authors : Bhaskar M. Murai, Neeraj Banchor, Ishveen Chhabra, Madhusudhan Nadgir, S. Vidhya

Abstract : Sol-gel technology combined with electronics and biochemistry helps to overcome the problems caused by mosquitoes by developing a portable, low-cost device which enables controlled release of trapped compound inside it. It is a wet-chemical technique which is used primarily for fabrication of silicate gel which is usually allowed to dry as per requirement. The outcome is solid rock hard material which is porous and has lots of applications in different fields. Taking porosity as a key factor, allethrin a naturally occurring synthetic compound with molecular mass 302.40 was entrapped inside the sol-gel matrix as a dopant. Allethrin is commonly used as an insecticide and is a key ingredient in commercially available mosquitoes repellent in Asian and subtropical countries. It has low toxicity for humans and birds, and are used in many household insecticides such as RAID as well as mosquito coils. They are however highly toxic to fish and bees. Insects subject to its exposure become paralyzed (nervous system effect) before dying. They are also used as an ultra-low volume spray for outdoor mosquito control. Therefore, there is a need for controlled release of allethrin in the environment. For controlled release of allethrin from sol-gel matrix, its (allethrin) we utilized temperature based controlled evaporation through porous sol-gel. Different types of fabric like cotton, Terri-cotton, polyester, surgical cap, knee-cap etc are studied and the best with maximum absorption capacity is selected to hold the sol-gel matrix with maximum quantity. For sol-gel coating 2 x 2cm cloth pieces are dipped in sol-gel solution for 10 minutes and by calculating the weight difference we concluded that Terri cotton is best suitable for our project. An electronic circuit with heating plate is developed in to test the controlled release of compound. An oscillatory circuit is used to produce the required heat.

Keywords : sol-gel, allethrin, TEOS, biochemistry

Conference Title : ICP 2015 : International Conference on Polymer

Conference Location : Paris, France

Conference Dates : February 23-24, 2015