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R&D 100 Award - 2004

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# Photopatternable Sorbent and Functionalized Films for Sensors, Devices, and Structures

## SUMMARY

Sorbent and functionalized polymers play a key role in a diverse set of fields, including chemical sensors, separation membranes, solid phase extraction techniques, and chromatography. Sorbent polymers are critical to a number of sensor array or “electronic nose” systems. The responses of the sensors in the array give rise to patterns that can be used to distinguish one compound from another, provided that a sufficiently diverse set of sensing materials is present in the array.

This new technology uses hydrosilylation as the bond-forming reaction to develop a versatile and efficient approach to developing sorbent polymers with diverse interactive properties for sensor applications. In this fashion, both the chemical and physical properties of these polymers are predictable and tunable by design. In addition, polymer formulations have been prepared that can be photopatterned into localized domains on surfaces.

This hydrosilylation chemistry offers tremendous versatility in the development of sorbent and functionalized polymers and thin films. Diverse sets of polymers can be prepared with control over chemical and physical properties of the resulting materials. The chemistry can be further utilized in the crosslinking, grafting, and patterning of thin films. The materials can be adapted to a variety of sensor types. These types of materials and films are useful or potentially useful for chemical sensors, sensor arrays, membranes, solid phase extraction, chromatography, and lab-on-a-chip applications.

Figure 1 shows a photopatterned poly(dimethylsiloxane) film made by this technology; Figure 2 shows the photopatterned lines of a carbosiloxane polymer containing fluorinated bisphenol groups; Figure 3 shows the range of chemical functionality and properties that may be incorporated.

Details have been published:

\* “Carbosiloxane polymers for sensors,” J.W. Grate et al., *Chemical Innovation*, November 2000, Vol. 30, 29-37.



### Patents & Intellectual Property

- » Patent #: 6,991,887

### Technology Portfolio(s)

- » Other
- » Materials Synthesis and Functionalization
- » Chemical Sensors

### Potential Industry Applications

- » Computers & Electronics

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