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Ryan et al.

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(54) **CO-POLYMER FILMS FOR SENSORS**

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(65) **Prior Publication Data**

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(51) **Int. Cl.**

C08F 26/06 (2006.01)

C08F 126/06 (2006.01)

(52) **U.S. Cl.** **526/260; 526/265**

(58) **Field of Classification Search** **526/260, 526/265**

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,543,326 A * 8/1996 Heller et al. 204/403.14

* cited by examiner

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(57) **ABSTRACT**

Embodiments include a sensor comprising a co-polymer, the co-polymer comprising a first monomer and a second monomer. For some embodiments, the first monomer is poly-4-vinyl pyridine, and the second monomer is poly-4-vinyl pyridinium propylamine chloride. For some embodiments, the first monomer is polystyrene and the second monomer is poly-2-vinyl pyridinium propylamine chloride. For some embodiments, the first monomer is poly-4-vinyl pyridine, and the second monomer is poly-4-vinyl pyridinium benzylamine chloride. Other embodiments are described and claimed.

11 Claims, 4 Drawing Sheets

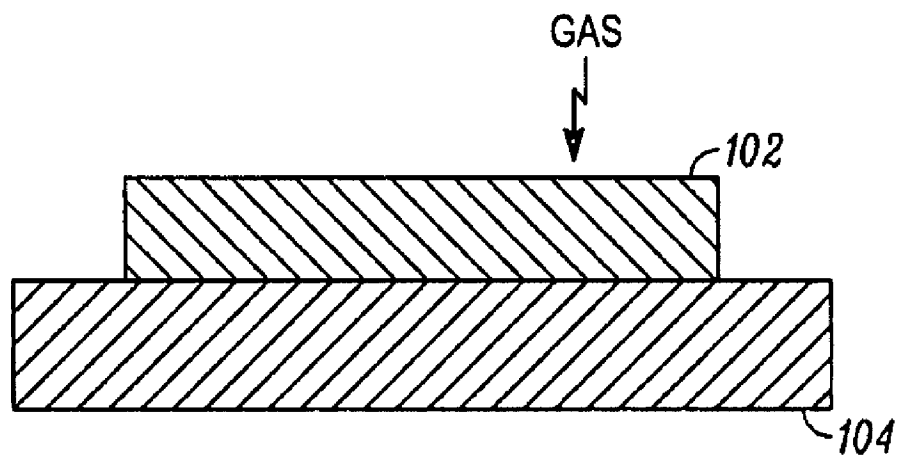


FIG. 1

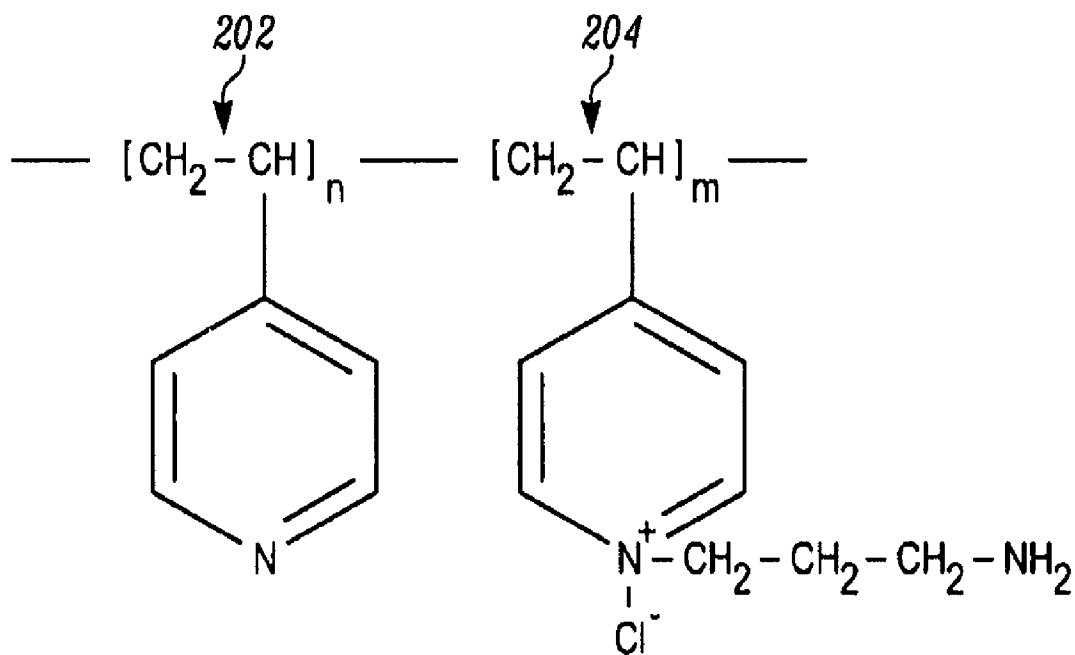


FIG. 2

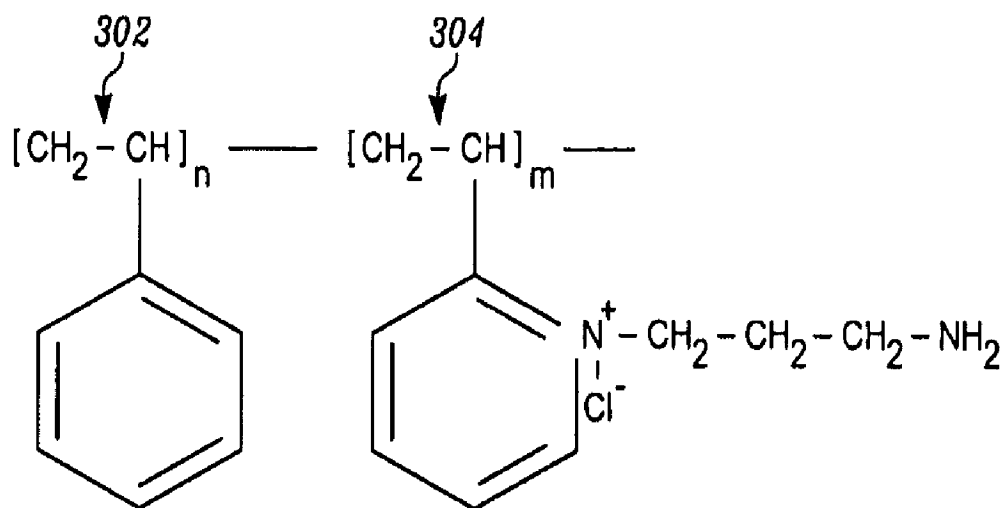
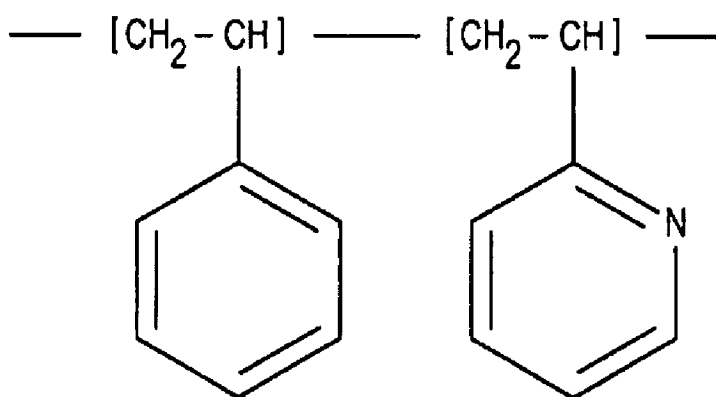
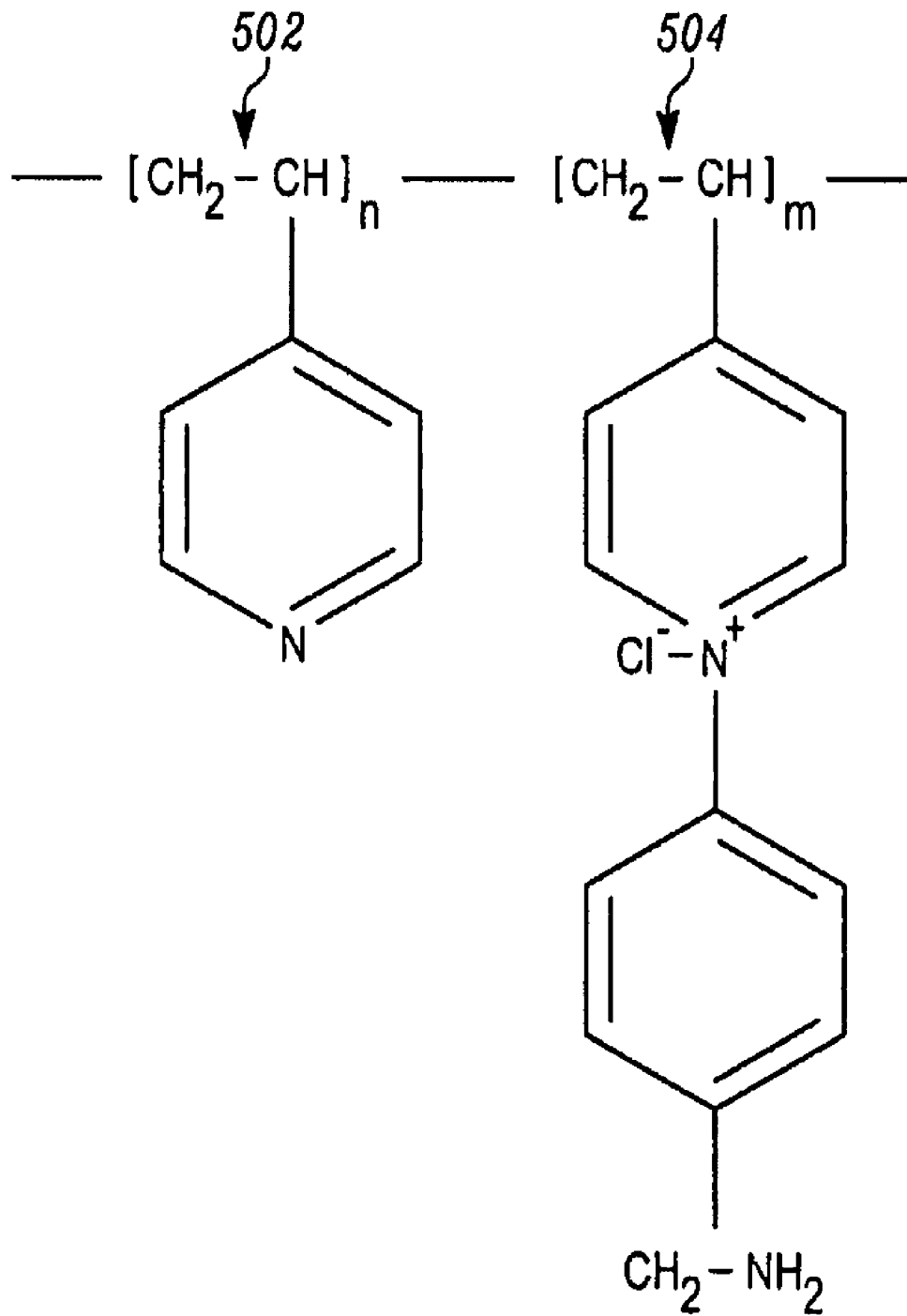


FIG. 3



(PRIOR ART)

FIG. 4

*FIG. 5*

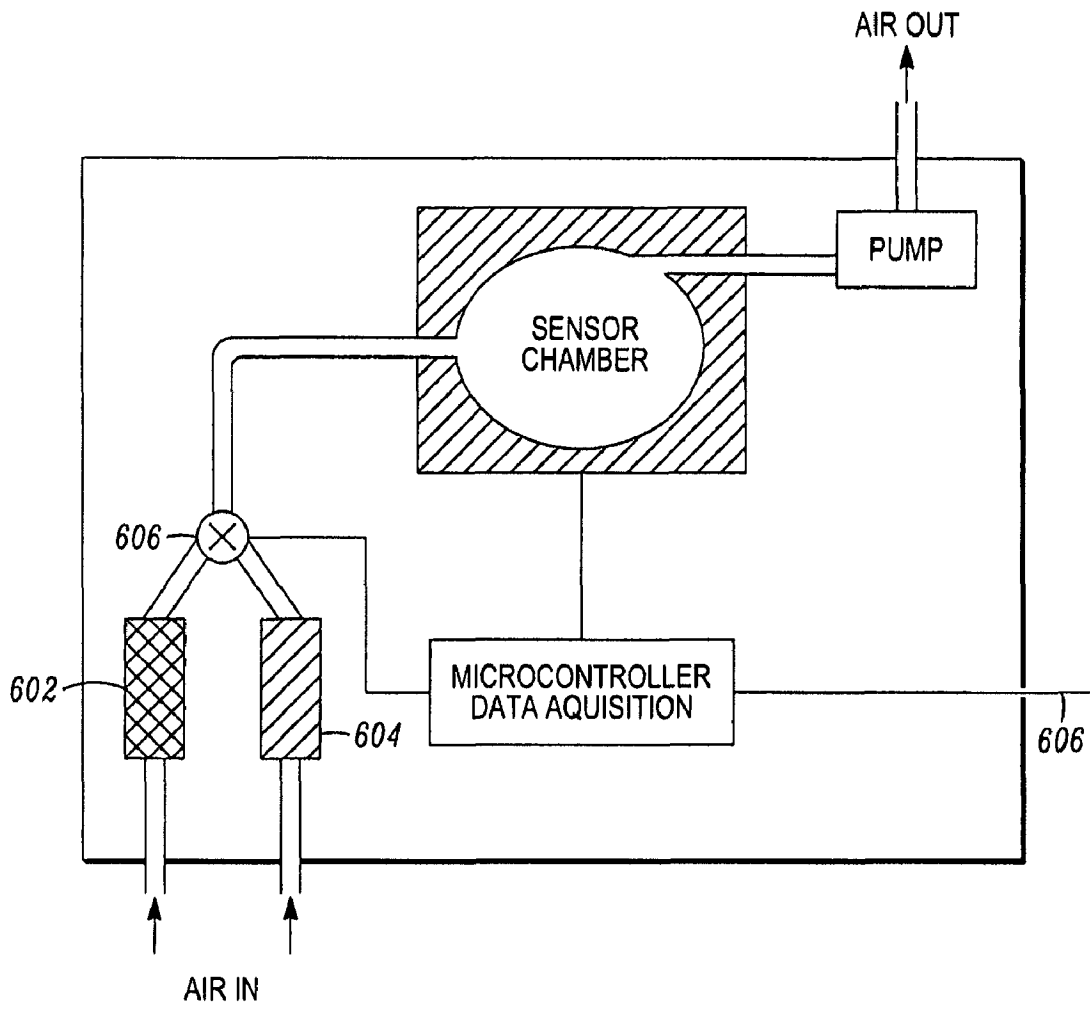


FIG. 6