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- (71) **Applicant** (for all designated States except US): **LUX BIO GROUP, INC.** [US/US]; P. O. BOX 438, 829 NE Sixth Avenue, Camas, Washington 98607 (US).
- (72) **Inventor; and**
- (75) **Inventor/Applicant** (for US only): **HOLT, Gordon** [US/US]; 16917 SW Kolding Lane, Beaverton, Oregon 97007 (US).
- (74) **Agents:** **DAVE, Raj S.** et al.; Pillsbury Winthrop Shaw Pittman LLP, P. O. BOX 10500, 1650 Tysons Blvd., Suite 1400, McLean, Virginia 22102 (US).

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(54) **Title:** APPARATUS AND METHOD FOR MOLECULAR SEPARATION, PURIFICATION, AND SENSING

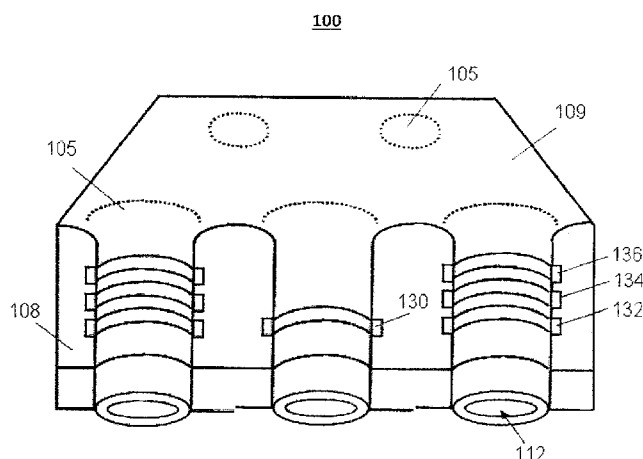


FIG. 1

(57) **Abstract:** Described are devices and methods for forming one or more nanomembranes including electroactive nanomembranes within a nanowell or nanotube, or combinations thereof, in a support material. Nanopores/nanochannels can be formed by the electroactive nanomembrane within corresponding nanowells. The electroactive nanomembrane is capable of controllably altering a dimension, a composition, and/or a variety of properties in response to electrical stimuli. Various embodiments also include devices/systems and methods for using the nanomembrane-containing devices for molecular separation, purification, sensing, etc.