NIH Genes and Environment Initiative
Exposure Biology Program

Environmental Sensors for Personal Exposure Assessment

David Balshaw, PhD

NIEHS

Program Lead

NIEHS National Institute of Environmental Health Sciences

National Cancer Institute

NIDA National Institute on Drug Abuse

National Heart Lung and Blood Institute
People Science Health

U.S. Department of Health and Human Services
National Institutes of Health
National Institute of Environmental Health Sciences

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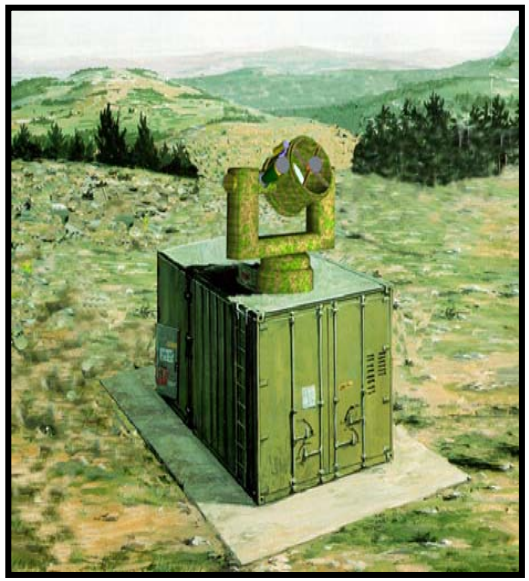

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Goal of this Solicitation – Improved Devices

Currently Available…

- **Indirect**
  - Environmental monitoring
  - Questionnaire
- **Limited**
  - Single Analyte
  - Little temporal/spatial information
- **Obtrusive**

In 4 years…

- **Direct**
  - Individual Exposure Metric
  - Breathing zone/Point of Contact
- **More Comprehensive**
  - Multiplex sensing
  - Near real-time
- **Minimally Intrusive**
  - Lightweight
  - ‘Easy to use’

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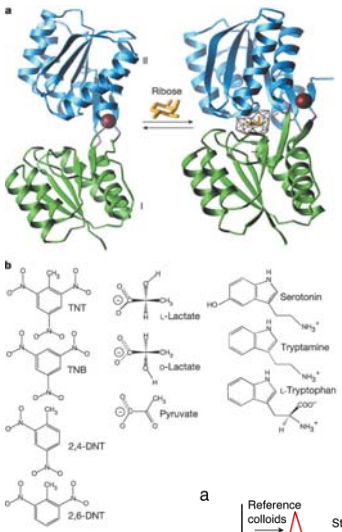

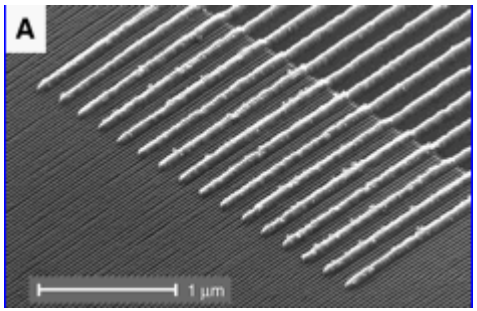

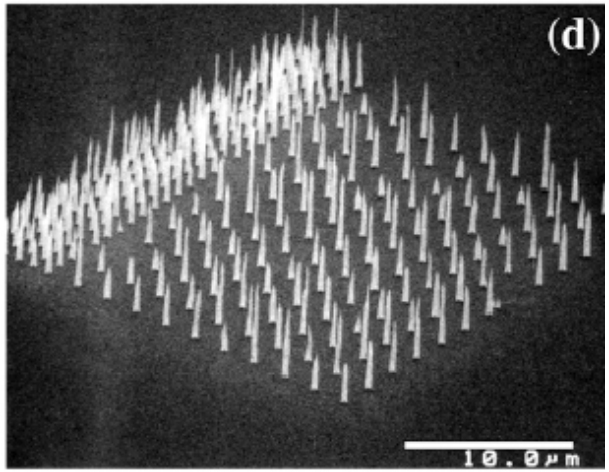

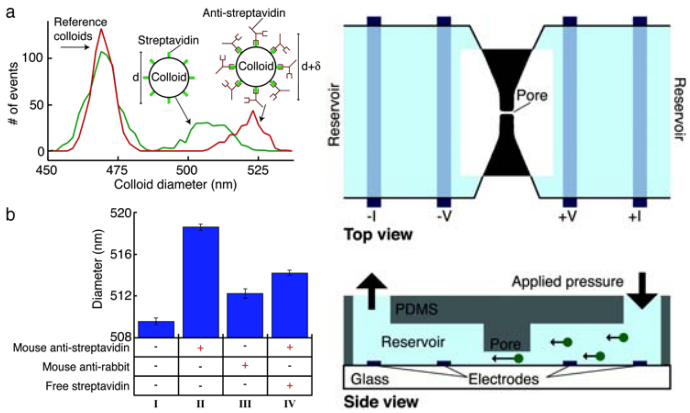

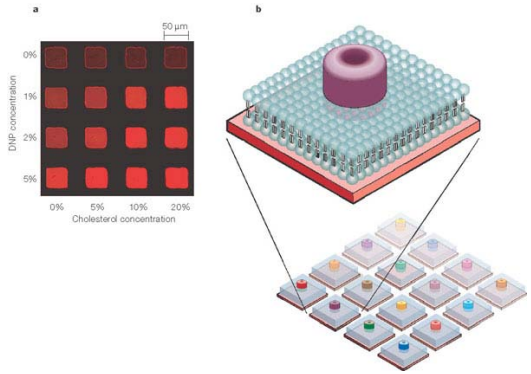

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Specific Goal(s)

- **Development of sensor *devices* (Product oriented – 4 year time frame)**
  - **Airborne/breathing zone or skin/POC exposure**
  - **Multiple Analytes simultaneously in relevant concentration ranges**
  - **Integration of telemetry/monitoring technologies**
  - **Inexpensive to deploy**
  - **Generalizable**

Applicants need not address all of these criteria

Priority Exposure Classes

- Ozone
- Particulate matter, Diesel exhaust
- Metals (e.g., arsenic, cadmium, mercury)
- Volatile organic compounds (e.g., benzene)
- Pesticides
- Polybrominated diphenyl Ethers (PBDEs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Mold/microbial toxins, Allergens

Responsiveness Criteria

- **Field-deployable or wearable devices**
  - Can be combined field-deployable capture devices with laboratory-based analyses
  - Exclusively laboratory-based technologies will not be considered responsive
- **Verifiable/Measurable Milestones**
  - 4 year timeline for device development
  - Annual milestones/deliverables
  - Go/No-Go decision points

Specific Review Criteria Criteria

- **Standard NIH Review Elements**
  - **Significance**
  - **Approach**
    - … **Provide evidence of the feasibility of incorporating the produced tools in population studies**
    - … **Realistic, well presented product development plan (milestones, timelines and goals)**
  - **Innovation**
    - … **The device will provide unique information**
  - **Investigator**
  - **Environment**
    - … **Critical partnerships needed for technology conceptualization, prototype development, field testing, and validation**

- **Questions – Contact RoseAnne McGee**