Fumigant Detoxification via Reusable Cotton Material

Tech ID: 32329 / UC Case 2021-602-0

ABSTRACT

Researchers at the University of California, Davis have developed wearable, highly adsorptive, cotton fabrics that can neutralize fumigants in both open-air and sequestered environments.

FULL DESCRIPTION

Fumigants have many industrial and agricultural uses – as vaporous pesticides to control microorganisms and insects in soils and other environment. Applications of the fumigants include fumigation of soil before plantation of fruits and vegetables and termite controls in building and grain. Human exposure to specific fumigants during production, storage, and application has long been a concern in many industries, as increased risks associated with exposure to fumigants may include higher rates of certain cancers, lung conditions, or even autoimmune diseases. Various mitigation techniques have been attempted. But all have had somewhat limited effects - because of either their inconvenience or cost limitations. Thus, better technologies are needed to minimize human exposure to these fumigants. And the increased need for Personal Protective Equipment (PPE) across multiple settings has also highlighted the importance of more effective methods to limit human exposure to both pathogens of all types and potentially harmful chemicals.

Researchers at the University of California, Davis have developed highly adsorbent cotton fabrics with demonstrated efficacy at neutralizing fumigant vapors and revealing a visible signal of accumulative exposure level. These materials use cotton fabrics containing highly porous organic "cages" on surfaces to capture fumigants and detoxify them quickly – often within one minute. The fabric is reusable and changes colors to indicate the level of fumigant exposure. These materials offer the advantages of being lightweight and flexible, and can be manufactured in high volumes at relatively low unit costs. Thus, these fabrics have the potential for widespread PPE applications, especially detoxifying respiratory devices, as well as upholstery and other products for residential and commercial settings.

APPLICATIONS

- Personal Protective Equipment (PPE) and respiratory applications
- Upholstery products in residential and commercial applications
- Can mitigate the exposure risks associated with humans working around stored fumigants

FEATURES/BENEFITS

- Flexible, adsorbent, and reusable
- Fast-acting
- Fabric is both relatively simple and inexpensive to manufacture and readily shaped into multiple types of final products
- Provides a color-based indication of both fumigant concentration and detoxification efficacy

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,264,162	04/01/2025	2021-602
United States Of America	Published Application	20250320220	10/16/2025	2021-602

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Photo-Rechargeable Antibacterial/Antiviral Materials
- Environmentally Friendly Manufacturing of Nano, Micro and Sub-micro Fibers with Hybrid CAB System

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OTHER INFORMATION

KEYWORDS

Fumigant, Detoxification, Personal Protective Equipment (PPE), Fumigation neutralization, PPE fabric

CATEGORIZED AS

- **Agriculture & Animal Science**
  - Animal Science
- **Environment**
  - Sensing
- **Materials & Chemicals**
  - Agricultural
  - Chemicals
  - Textiles

RELATED CASES

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