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Use of Organic Conductive Polymer for Multiplexed Beam Imaging

Stanford inventors have developed an alternative slide coating for multiplexed ion beam imaging using a conductive organic polymer material. This new technology eliminates the high background noise from the use of gold slide coatings and improves conductivity for imaging thick, dense tissue.

Multiplexed ion beam imaging (MIBI) is an imaging technology based on secondary ion beam mass spectrometry that enables the use of heavy metal isotope-conjugated antibody stains to label histological samples with a high number of cellular markers (40+). Currently, MIBI requires the use of gold in sample slides to create the conductive surface necessary to prevent surface charge accumulation which would cause inconsistent signal across the region of interest. However, in very porous tissues (like lung), exposed gold can produce a high amount of background noise, and in very dense tissues (like brain tissue), lack of conductivity can still be an issue even with gold coatings.

In this invention, Stanford scientists have discovered a new organic polymer material for coating MIBI slides that eliminates background noise from gold coatings and improves conductivity. This new slide design improves MIBI imaging performance over gold-coated slides and provides a transparent slide material to allow sample imaging with light-based microscopy as well.

Applications

- Improved slide coating material for multiplexed ion beam imaging for applications like biological research, pathology, and diagnostics

Advantages

- Reduced background noise by eliminating use of gold-coated slides
- Extend life span of expensive consumable components (ion detector) of the MIBI system
- Reduce data storage from gigabytes to megabytes
- Improved conductivity to reduce charge accumulation for more consistent signal across sample
- Improved MIBI performance, especially in larger tissue volumes and brain tissue
- Transparent, allowing collection of light passed through the sample
- Cost-effective high-volume production of conductive slides

Patents

- Published Application: WO2023064191
- Published Application: 20250179326

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