Transparent Plasma-Activated Coated Glass Substrates

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Opportunity

The global medical coatings market is growing rapidly, with a CAGR of 18.6% and a forecasted market value of over USD 28.1 billion by 2028. While borosilicate glass is an excellent material for live cell imaging, it requires protein coatings for *in vitro* cell culture, which currently use weak physical adsorption or complex wet chemical covalent approaches which are limited and potentially leaving toxic residues. To address this, there is a significant opportunity for an improved protein coating method that is compatible with a wide range of proteins and protein mixtures. Developing such a method could drive growth in the global medical coatings market.

Technology

The technology relates to a new plasma-activated coating (PAC) process that enables covalent attachment of any protein to a glass surface without using chemical linkers or in fact any additional reagents. PAC is a thin, strongly adherent, and radical-rich layer that allows direct attachment of proteins from solutions by reactions with embedded radicals. PAC surfaces can be engineered for improved protein attachment by altering the chemical composition of the PAC layer in the plasma process. This allows for the attachment of different proteins and the promotion of lineage-specific differentiation of stem cells or induction of specific cell phenotypes.

PAC has minimal impact on visible light transmission, making it ideal for live cell imaging and other optical observation techniques. This technology offers the possibility to individually tailor cell culture surfaces on borosilicate glass at reduced cost and with greater flexibility of biomolecule choice.

Market Comparable Advantages

- Rapid and cost-efficient process with outstanding reproducibility
- Flexibility and customizable with individual proteins or defined protein mixtures
- PAC coated coverslips are compatible with microcontact printing and microarray techniques
- Free from any additional chemical reagents and potentially toxic residues
- High adaptivity - can be used in fluorescence imaging of live cells, confocal microscopy, high resolution, inverted microscopy, and phase contrast microscopy.

Potential Commercial Applications

- Biomedical research and development, especially for cell culture and microfluidic devices
- Enhancing cell attachment and growth of fastidious cells (e.g., primary cells, neuronal cells, endothelial and tumor cells) which may not easily adhere to or differentiate into specialized cell types on traditional surfaces
- Specialized cell cultures for large-scale high-throughput drug discovery
- Stem cell expansion and differentiation cultures
- Cultures of patient-derived pluripotent cells for personalized medicine.

Inventors

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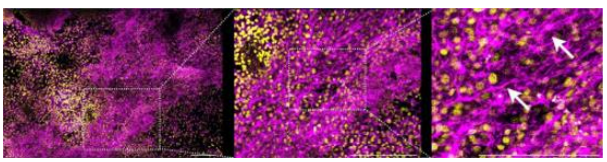
Intellectual Property Status

This IP is wholly Sydney-owned and is protected by PCT Application No. PCT/AU2023/050317.

Technology Development

Currently at TRL4, the inventors have demonstrated the efficacy and assessed the covalent immobilisation and binding processes of different proteins and defined protein mixtures. They are looking to elevate the technology to TRL 5-6 by engaging with customers and constructing the prototypes according to specific customer requirements.



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