

Novel Carbohydrate Cluster Microarrays Technology for Profiling Glycan Functions

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Abstract

First, we introduce a novel, ready-to-use bioarray platform and methodology for construction of sensitive carbohydrate cluster microarrays. This technology utilizes a 3-dimensional (3-D) poly(amidoamine) starburst dendrimer monolayer assembled on glass surface, which is functionalized with terminal aminoxy and hydrazide groups for site-specific coupling of carbohydrates. A wide range of saccharides, including monosaccharides, oligosaccharides and polysaccharides of diverse structures, are applicable for the 3-D bioarray platform without prior chemical derivatization. The process of carbohydrate coupling is effectively accelerated by microwave radiation energy. The carbohydrate concentration required for microarray fabrication is substantially reduced using this technology. Importantly, this bioarray platform presents sugar chains in defined orientation and cluster configurations. It is, thus, uniquely useful for exploration of the structural and conformational diversities of glyco-epitope and their functional properties. Its potential in glycomics application is demonstrated by chip-display of a panel of glyco-epitopes for highly sensitive detection of carbohydrate-binding proteins and construction of sugar microarrays for differential detection of the Influenza hemagglutinins of H3N1 and H5N1.

We will also briefly introduce our recently research on the development of Au glyconanoparticles and fluorescent glycol-nanoparticles, as well as the application of the glyconanoparticles for biotoxin detection and bio-imaging.

Biography

Dr. Xichun Zhou received his Ph.D. degree in organic and bioanalytical chemistry at Wuhan University (1994) and had postdoctoral training in the Department of Chemistry, Cambridge University, UK. He has been a Senior Research Scientist at ADA since 2005, where he leads a program in glycomics and development of biotechnology and biochemical devices. Prior to joining ADA, he was a Research Scientist at Oak Ridge National Laboratory where he led projects on surface chemistries associated with nanoengineered interface of DNA, proteins and carbohydrates for microarray/biochips and biosensor application. Dr. Zhou had a joint appointment with the Graduate School of Genome and Technology at the University of Tennessee during year 2003-2005, where he managed and conducted a project for development of microarray technology. Dr. Zhou has authored twenty peer-reviewed papers, three invited book chapters, and two US Patents in protein microarray and glycomic technology. He has served for NIH study sections in Special Emphasis Panel in 2007.

Speaker Info

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