

# Automated Glycan Assembly: Basis for Vaccines, Diagnostics and Material Science

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Pure glycans are key to enable biochemical, biophysical and immunological studies aimed at understanding the role of carbohydrates. Described is the development of a fully integrated platform for automated glycan assembly (AGA) based on solid-phase oligosaccharide synthesis<sup>1-3</sup> that has been commercialized.<sup>4</sup> Quality control of synthetic glycans has been simplified and accelerated using ion mobility mass spectrometry.<sup>5</sup>

Access to diverse oligosaccharides<sup>6</sup> and defined polysaccharides as long as 50-mers enables now biological as well as materials science investigations.<sup>7</sup> These synthetic polysaccharides can be combined much like “molecular LEGO” to create even larger oligosaccharide assemblies to address fundamental questions of carbohydrate structure, folding and material science applications.

Carbohydrate arrays are used as diagnostics and in support of vaccine programs that are based on conjugates with synthetic oligosaccharides to screen blood sera.<sup>8-10</sup> Case studies of specific vaccines against *Streptococcus pneumoniae*, *Clostridium difficile* and others will provide an appreciation for the approach that is now advancing candidates toward clinical testing.<sup>11-13</sup> Fully synthetic vaccine candidates exploit iNKT cells for to induce a robust and protective immune response.<sup>14</sup>

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