Chemical glycosylation
NSF, CHE-0547566, 1058112

Oligosaccharide assembly
NIH, GM077170

Biomedical applications
NIH-AI067494, Pfizer 8500124946

Innovative technologies
NIH, GM090254, GM111835
Our contribution to the development of new methods for chemical glycosylation

- Glycosyl thioimidates as new donors for stereoselective glycosylation

- Discovered an O-2/O-5 cooperative effect in glycosylation
  Kamat, Org. Lett., 2005, 7, 3215

- Approach to 1,2-trans glycosylation using ether-type participating moiety

- Coordination chemistry approach to controlling stereoselectivity of glycosylation (With Dirk Steinborn)
  Pornsuriyasak, Chem. Commun., 2009, 6379

- Stereoselective 1,2-cis glycosylations using bromine: a mechanistic study

- Hydrogen-bond-mediated Aglycone Delivery (HAD)

- Regenerative glycosylation via nucleophilic catalysis (with Keith Stine)
Our contribution to strategies and technologies for oligosaccharide synthesis

- **Oligosaccharide synthesis via temporary deactivation**

- **Inverse armed-disarmed approach**

- **Electronic and/or conformational superararming and superdisarming of glycosyl donors by simple alteration of protecting groups**

- **Developed five new sets of leaving groups for orthogonal oligosaccharide synthesis**

- **Introduced reverse orthogonal approach**
  Fujikawa, *Chem. Commun.*, 2011, 47, 10602

- **Surface-tethered iterative carbohydrate synthesis (with Stine)**

- **HPLC-based automation for oligosaccharide synthesis (with Stine)**
Biomedical studies: outline of current collaborative efforts of the Glycoworld

- Development of **synthetic conjugate vaccines** (*S. pneumoniae* with M. Nahm, UAB and *S. aureus* with S. Kolodziej, Pfizer)

- Investigation of glyco-amino acid conjugates as LPS-antagonistic **anti-septicemia therapeutics** (with M. Nichols, UMSL)

- Glycosyl **thioimidates as inhibitors** (and substrates) of (for) glycosyltransferases and hydrolases (with R. Daniellou, France)

- Investigation of modified **aminosugars as substrates** for yeast chitin synthase 2 (with P. Orlean, UIUC and N. Price, FDA)

- Unnatural glycosphingolipids to study the pathogenesis of **Krabbe disease** (with M. Sands, WUSTL), other glycolipids (with S. Wang, UMSL)

- Investigation of fluorescent carbohydrates as **imaging reagents in vivo** (with L. V. Wang, WUSTL and M. Berezin, WUSTL)

- Development of **anti-cancer therapeutics** (*in vivo* studies of glycopeptides with A. Spadaro, Catania, other molecules are studied with an industrial collaborator)
GLYCOWORLD at UMSL: Carbohydrates in Chemistry, Biology and Medicine

Alexei V. Demchenko

S. Pneumoniae 14

High mannose N-glycan

SSEA-3

AM-12

S. Pneumoniae 6A

STn

ent-Psychosine

Staphylococcus aureus type 5 and 8

S. Pneumoniae 6B

2-NBDG