In this issue

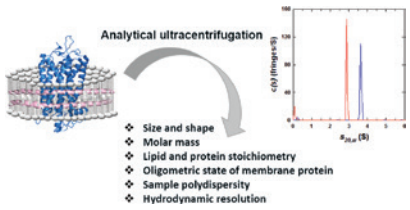
Sayaka Inagaki and Rodolfo Ghirlando

Nanodisc characterization by analytical ultracentrifugation

DOI 10.1515/ntrev-2016-0082
Nanotechnol Rev 2017; 6(1): 3–14

Review: Analytical ultracentrifugation can characterize nanodisc preparations, reporting on their size, shape, molar mass, and polydispersity in a straightforward manner without sample modification.

Keywords: analytical ultracentrifugation; lipid; membrane protein; nanodisc.



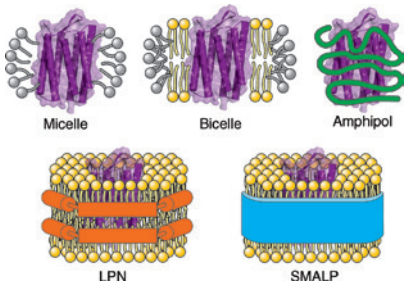
Konstantin S. Mineev and Kirill D. Nadezhdin

Membrane mimetics for solution NMR studies of membrane proteins

DOI 10.1515/ntrev-2016-0074
Nanotechnol Rev 2017; 6(1): 15–32

Review: Review on the properties, history of implementation, and peculiarities of membrane mimetics that are conventionally used in solution NMR studies of membrane proteins.

Keywords: bicelles; membrane mimetics; micelles; nanodiscs; NMR.



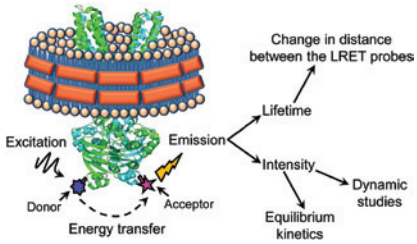
Maria E. Zoghbi and Guillermo A. Altenberg

Membrane protein reconstitution in nanodiscs for luminescence spectroscopy studies

DOI 10.1515/ntrev-2016-0078
Nanotechnol Rev 2017; 6(1): 33–46

Review: Nanodiscs are ideal platforms for spectroscopic studies of membrane proteins in a near-physiologic environment.

Keywords: ATP-binding cassette; LRET; luminescence resonance energy transfer; MsbA; multidrug resistance.



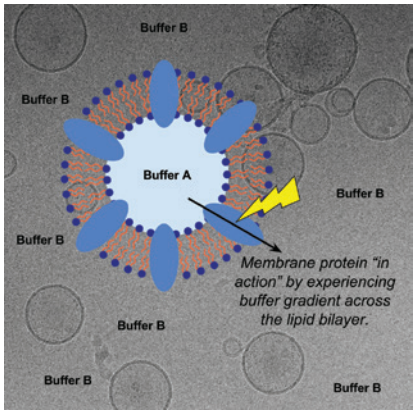
Kushal Sejwal, Mohamed Chami, Paul Baumgartner, Julia Kowal, Shirley A. Müller and Henning Stahlberg

Proteoliposomes – a system to study membrane proteins under buffer gradients by cryo-EM

DOI 10.1515/ntrev-2016-0081
Nanotechnol Rev 2017; 6(1): 57–74

Review: Proteoliposomes are lipidic vesicles with reconstituted membrane proteins in their lipid bilayer. These proteoliposomes can be imaged by cryo-electron microscopy, as shown in this figure, allowing the structural determination of the membrane proteins in the membranes. Preparing proteoliposomes in buffer A and exchanging the outer buffer to buffer B allow the setting up of a buffer gradient across the membranes, thereby establishing a salt, pH, or ion concentration gradient, or even electric voltage.

Keywords: buffer gradient; cryo-electron microscopy; image processing; membrane proteins; proteoliposomes.



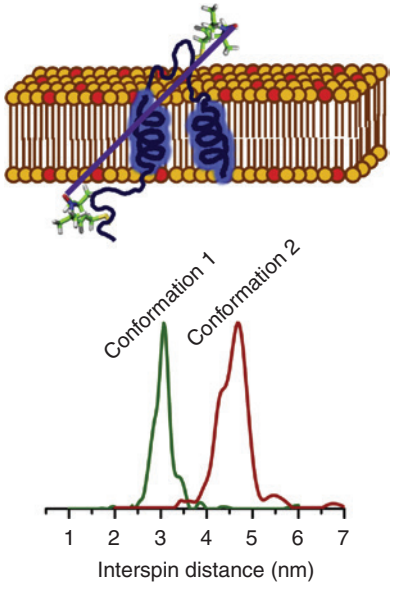
Elka R. Georgieva

Nanoscale lipid membrane mimetics in spin-labeling and electron paramagnetic resonance spectroscopy studies of protein structure and function

DOI 10.1515/ntrev-2016-0080
Nanotechnol Rev 2017; 6(1): 75–92

Review: Described are applications of phospholipid-based nanosized membrane mimetics, such as liposomes, bicelles and nanodiscs, in conjunction with the powerful biophysical technique electron paramagnetic resonance in study of protein structure and function.

Keywords: bicelles; electron paramagnetic resonance spectroscopy; liposomes; membrane protein structure and function; nanodiscs.



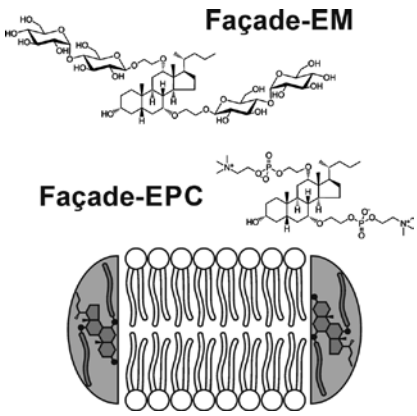
Konstantin S. Mineev, Kirill D. Nadezhdin, Sergey A. Goncharuk and Alexander S. Arseniev

Façade detergents as bicelle rim-forming agents for solution NMR spectroscopy

DOI 10.1515/ntrev-2016-0069
Nanotechnol Rev 2017; 6(1): 93–103

Research highlight: Façade-EM and Façade-EPC were implemented as rim-forming agents for small isotropic bicelles for structural studies by solution NMR spectroscopy.

Keywords: bicelles; Façade detergents; membrane protein; NMR spectroscopy.



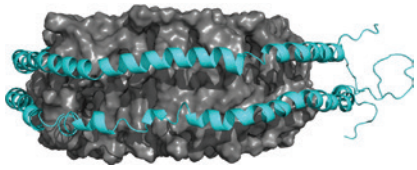
Cédric Eichmann, Stefan Bibow and Roland Riek

α-Synuclein lipoprotein nanoparticles

DOI 10.1515/ntrev-2016-0062
Nanotechnol Rev 2017; 6(1): 105–110

Review: The protein α-synuclein plays a pivotal role in Parkinson's disease. It shares a high sequence similarity with apolipoproteins, and in the presence of phospholipids α-synuclein can form apolipoprotein nanodisc-type particles by a disorder-to-helix structural change.

Keywords: lipoprotein; nanodiscs; NMR; Parkinson's disease; α-synuclein.



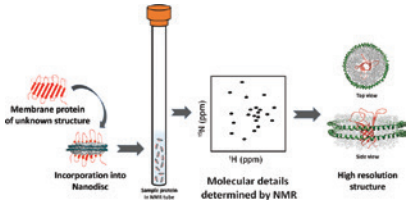
Robbins Puthenveetil, Khiem Nguyen and Olga Vinogradova

Nanodiscs and solution NMR: preparation, application and challenges

DOI 10.1515/ntrev-2016-0076
Nanotechnol Rev 2017; 6(1): 111–125

Review: Structure determination of membrane proteins in nanodiscs using solution NMR.

Keywords: beta barrel; integrin; membrane proteins; nanodisc; nanoscale phospholipid bilayers; saposin-A; SMALP; solution NMR; styrene maleic acid; transmembrane.



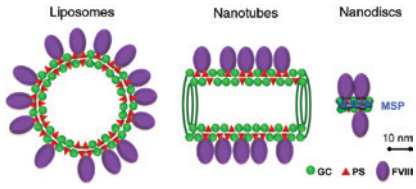
Svetla Stoilova-McPhie

Lipid nanotechnologies for structural studies of membrane-associated clotting proteins by cryo-electron microscopy

DOI 10.1515/ntrev-2016-0066
Nanotechnol Rev 2017; 6(1): 127–137

Review: Blood coagulation factor VIII (FVIII) binds specifically to phosphatidylserine (PS) containing lipid membranes. Liposomes are single bilayer lipid vesicles. Nanotubes are single bilayer lipid nanotubes self-assembled from galactosylceramide lipids (GC). Nanodiscs are lipid bilayer patches held together by membrane scaffolding proteins (MSPs). The macromolecules and nanotechnologies are drawn to scale.

Keywords: blood coagulation factors; cryo-electron microscopy; lipid nanotechnologies; macromolecular structure; membrane-associated proteins.



Kirill Grushin, Mark Andrew White and Svetla Stoilova-McPhie

Reversible stacking of lipid nanodiscs for structural studies of clotting factors

DOI 10.1515/ntrev-2016-0073
Nanotechnol Rev 2017; 6(1): 139–148

Research highlight: Electron micrograph of negatively stained Y-branched and side-attached ND stacks formed after a 60-min incubation in the presence of 10 mM $CaCl_2$. The insets show short ND stacks of two and three ND formed at less than 5 mM $CaCl_2$. The number of ND stacks per micrograph and the distribution of the ND stacks by lengths at different $CaCl_2$ concentrations are shown on the graph.

Keywords: cryo-electron microscopy; lipid nanodiscs; phospholipids; stacking of nanodiscs.