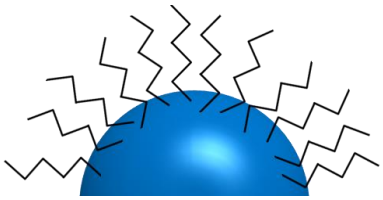
PolyAn Hydrophobic Beads
for the Immobilization of Lipid-containing Biomolecules

PolyAn
molecular surface engineering

PolyAn Hydrophobic Beads

PolyAn has developed hydrophobic beads that are characterized by a high contact angle with water, and are stable in organic solvents such as methanol, acetone and even chloroform (up to 50% v/v).

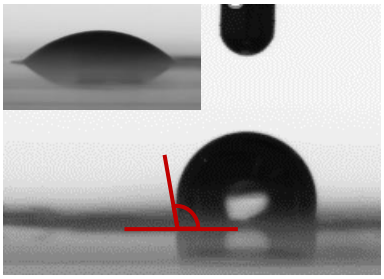
PolyAn's hydrophobic beads may be applied to immobilize amphiphilic biomolecules like phospholipids, lipopolysaccharides, lipoproteins, or even membrane-based receptors after cell-lysis.



Lipid-containing Biomolecules as Biomarkers

Amphiphilic biomolecules like phospholipids, lipopolysaccharides, and lipoproteins play a key role in many biological processes, and can potentially be used as future biomarkers for the diagnosis of e.g. autoimmune and neurodegenerative diseases, atherosclerosis, diabetes, Alzheimer's disease, or cancer.

Hydrophobic beads are a promising platform for the detection of such biomarkers, as they allow a directed (oriented) immobilization of lipophilic/amphiphilic biomolecules from organic solvents.

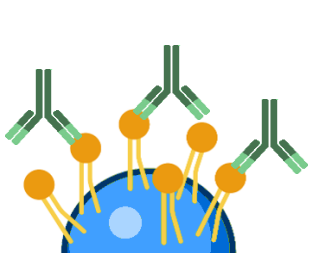


Contact angle of water with hydrophobic beads dried on a glass slide (Inset: Hydrophilic beads for comparison).

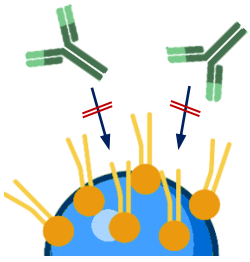
Importance of Oriented Binding

The challenge in developing bead-based bioassays for lipophilic/amphiphilic biomolecules is to immobilize them in an oriented direction.

Due to the hydrophobic bead surface, the tails of the lipophilic biomolecules are oriented towards the bead, while their hydrophilic heads are directed towards the outside. This directional immobilization is absolutely necessary to allow for subsequent binding of detector molecules (e.g. antibodies) within bioassays.



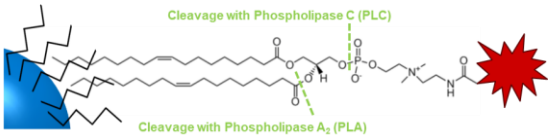
Oriented immobilization enables specific binding

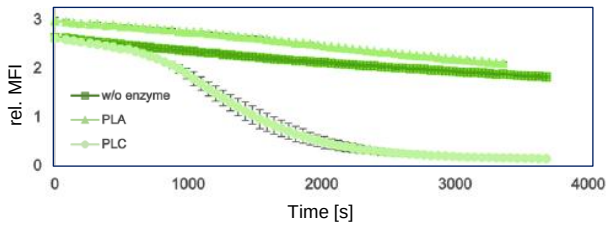


No binding possible due to wrong orientation.

User case: Oriented Binding of Phospholipids

PolyAn's hydrophobic beads were applied for the directed binding of cardiolipin, phosphatidylethanolamine, and phosphatidylcholine. Oriented immobilization was confirmed by enzymatic cleavage of the dye-labeled phospholipids:





Dye-cleavage was only observed with PLC, which confirmed that the phospholipids were bound oriented via their lipophilic tails. Figures adapted from the publication of F. Dinter *et al.*, 'Immobilisation of Lipophilic and Amphiphilic Biomarker on Hydrophobic Microbeads', bioRxiv, 2023, DOI: 10.1101/2023.01.10.523433 (preprint).

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PolyAn – Molecular Surface Engineering

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High performance consumables

PolyAn is a nanotechnology company specialized in Molecular Surface Engineering. Since 1996 PolyAn develops and manufactures consumables for multiplex diagnostic and LifeScience research. This includes the broadest portfolio of microarray consumables (slides, plates) on the market.

PolyAn also offers functionalized plates for immunoassays (e.g. ELISA) and has developed a wide range of fluorescence encoded PMMA microparticles (beads) for multiplex bead assays and flow cytometry. Our calibration tools are widely used in fluorescence imaging systems.

Ordering information

We are looking forward to your telephone orders and technical enquiries at our Customer Service and Technical Service Department Monday – Friday. Office hours for telephone enquiries are 9:00 AM to 6:00 PM (Central European Time).

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