

## 3D-Printed Microfluidic Chip to Study Protein Organization in Lipid Bilayer

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To explore the dynamic protein organization embedded in a lipid bilayer, it is needed to form a horizontal free-standing bilayer to perform direct optical measurements. To that aim, the created microfluidic device addresses to form horizontal free-standing bilayers by using an easy approach. As a first step of this study, we developed a layout for a 3D microfluidic chip whose master can be fabricated by 3D-Printing technique. Inside the microfluidic device a lipid bilayer is formed in a quasi-automatic manner by contacting two water droplets that are immersed in an oil phase, where lipid molecules have been dissolved. This microfluidic platform is passive and does not require active microfluidic manipulation. Besides, for the ease of its use it is perfectly suited to screen an extended parameter space for different phospholipid compositions. The bilayer formation is demonstrated by electrophysiological measurements (Patch-Clamp) and optical investigations with a normal view direction onto the bilayer. This system allows us to reconstitute membrane proteins in this bilayer and follow their dynamical self-organization properties by fluorescence microscopy methods.