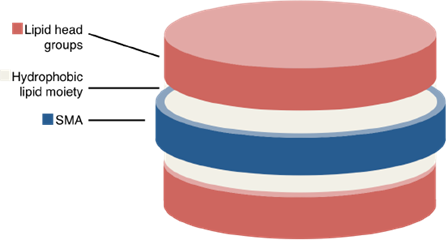
**FTO Report**

**For CRO Co.**

**New Antibody Service Using SMALP**

2023/11/11

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**Brief Summary**

**Background of the project**

* 1. **Launch Status Assessment**

Object of this Freedom to Operate Report (FTO) is therapeutic antibody discovery services for membrane proteins using the technology of Styrene Maleic Acid Lipo-Protein (SMALP). The therapeutic antibody discovery services entrust us for this report is hereinafter referred to as ***TADS***.

Client in this case title of *CRO Co*., British organization *Contract Research Organization*. Potential market for this discovery service application is the UK market. Therefore, this FTO report will be written based on the principle of Section 60 of the *UK Patent Act.* regarding the respect of infringement.

* 1. **Technical Feature**

A styrene-maleic acid co-polymers (SMAs) is a promising approach to detergent-free solubilize membrane proteins (MP). Most of the other processes require detergents to extract native MPs from cellular membranes (Dorr et al. 2016).

SMAs exhibit a significantly different mode of action from detergents. Addition of SMAs to synthetic or biological lipid membranes leads to the spontaneous formation of disc-shaped particles with a diameter of approximately 10 nm (Jamshad et al. 2015). In this novel SMAs bound nano disk, the bilayer structure of the incorporated lipid molecules is stabilized(Orwick et al. 2012). It had different names from different research at early stages but nowadays most commonly used name right now is SMALPS.

|  |  |  |  |
| --- | --- | --- | --- |
| **Alternative Name** | SMA–lipid particles (SMALPs) | Lipodisq particles | native nanodiscs |
| **Research** | (Knowles et al. 2009) | (Orwick et al. 2012) | (Dörr et al. 2014) |

**Chart 1.** Other names for the particles and related publication

**Related Patents**

The search was conducted by a professional patent search company in PatBase. The most relevant from this comprehensive patent search are 3 patents granted in UK shown below.

**2.1 Patent 4**

US 2012142861B2,

SOLUBILISATION OF MEMBRANE PROTEINS

This patent is published on 13 January 2011. It focusses on method to solubilise a membrane protein.

This method is applied to molecular in cell membrane including proteins and related lipids. It is done by mixing copolymer of 1:2 to 10:1 styrene and maleic acid, with cellular component to form soluble macromolecular assemblies of the copolymer, lipids, and proteins.

**2.2 Patent 11**

*WO2008/065451,*

*COMPOSITIONS COMPRISING MACROMOLECULAR ASSEMBLIES OF LIPID AND SURFACTANT*

This patent is published on 5 June 2008. It is the originally patent of *SAMLP* although name of it is *Lipodisq*represent in the document.

It provides composition comprising lipids and surfactants. The surfactant in it has an HLB number of less than 20. The lipids and surfactants form the less than100nm macromolecular assemblies.

**2.3 Patent 12**

*WO2007/115165*

*STYRENE-MALEIC ANHYDRIDE COPOLYMERS FOR BIOAPPLICATIONS AND THEIR PREPARATION*

This patent is published on 11 October 2007. It focusses on the solvent free technology to prepare SMA.

It is mentioned that solvent-free method results in a reduction in the amount of residue, such as unreacted styrene and/or maleic anhydride monomers, making copolymers particularly suitable for biological applications.

**Infringement Comparison**

3.1 Similar Proportion of Precursor Substances with Patent 4

3.2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Possible Infringement aspects | | | | | | | |
| SMA Synthesis Method | IR | S: MA Ratio | IR | surfactant  HLB | IR | Assembly Size | IR |
| TADS | Basic Hydrolysis Protocol | - | 3:1 | - | 16.5 | 5 |  |  |
| Patent 4 |  | 0 | 1:2 to 10:1 | 5 |  |  |  |  |
| Patent 11 |  | 0 |  |  | >20 |  | >100nm |  |
| Patent 12 | Solventless Method | 0 |  |  |  |  |  |  |

**Risk Aversion Suggestions**

Conclusion

Reference