

## ABSTRACT FOR THE GENERAL PUBLIC

**The main goal of the presented project is to obtain innovative Supported Ionic Liquid Phase systems using oxide composites and biopolymer material as supports and their use to prepare catalytic systems for hydrosilylation reactions.** The use of oxide systems such as silica - titanium dioxide and silica - magnesium oxide as supports opens up many application possibilities. A combination of two oxides not only increases the porous surface, but also modifies the physical and chemical properties of the materials obtained. The combination of silica, which is a commonly used support, characterized by very good sorption properties, with titanium oxide with photocatalytic properties, or magnesium oxide with good refractometric and thermal properties, opens the way to many applications. The use of lignin characterized by very good adsorption properties and high biocompatibility is also attractive as it offers a new way of disposing of post-production waste. Ionic liquids, which are an integral part of SILP materials, not only perfectly fit into the principles of "green chemistry", but are also perfectly suitable in catalysis, especially in biphasic systems.

**The materials that are planned to be used will permit obtaining stable SILP systems showing a wide range of properties.** The systems obtained will be subjected to comprehensive characterization. Incorporating of rhodium and platinum catalysts into the structure of SILP materials will provide information on catalytic activity of Rh-SILP and Pt-SILP materials in hydrosilylation reactions. Heterogenization of popular catalysts will allow easy recycling and reduction of the amount of the catalyst needed, which will undoubtedly be reflected in the costs of the processes.

**The presented research project combines three important areas of study: material engineering, catalysis and environmental protection.** The idea of producing SILP materials stems from the attractiveness of combination of the advantages of ionic liquids and porous materials. As a result of physical adsorption of the ionic liquid and the catalyst on the support, a completely new catalytic system is formed. The use of these materials is expected to help overcome the limitations associated with mass transport between phases that occur in standard biphasic liquid-liquid systems. On the other hand, the adsorption of the catalyst means that its leaching is limited, which reduces its amount in the final product. The wide possibilities of modifying the structure of this type of materials, especially the selection of ionic liquid and support, allow obtaining a system that works perfectly in given conditions. The use materials of this type is not limited only to catalysis. SILP systems have been successfully used also in separation techniques and gas purification.

**Results of the proposed project will provide information on the effects of the type of support, ionic liquid and catalyst used on the durability, stability and catalytic activity of the obtained SILP materials. The use of transition metal (Rh, Pt) catalysts will contribute to extending the applicability of SILP materials in the hydrosilylation reaction. The effective use of manufactured catalytic systems will be reflected in the reduction of reaction costs, and will also have a positive impact on broadly understood environmental protection.**