Is it necessary to employ costly catalysts and contend with challenging residue removal from highly toxic platinum or rhodium catalysts when obtaining commonly used organometallic compounds of silicon, boron, or germanium? As it happens, no. Utilizing catalysis based on readily available 3d-electron metals found in nature (*e.g.*, manganese and nickel) allows for maintaining high selectivity and process efficiency while concurrently reducing costs. Furthermore, compounds of first-row transition metals generally demonstrate lower toxicity compared to analogous derivatives of noble metals.

How can we accomplish this? Traditionally, the synthesis of organometallic compounds relies on the utilization of noble metal complexes, such as platinum, iridium, or rhodium. This preference is driven by the remarkable properties of these substances, characterized by their suitable electronic structure, ease of oxidation state adjustments, and the ability to easily modify the coordination sphere, among other attributes. Fortunately, the continual advancement in our understanding of the synthesis and characteristics of transition metal catalysts has played a pivotal role in driving substantial progress in the realms of organic and organometalloidal synthesis.

Addressing the challenges in catalysis, transition metals with 3d electrons come to the forefront. For example, would not it be more beneficial to investigate the application of nickel compounds, given that nickel is approximately 1800 times less expensive than platinum or 8400 times more economical than rhodium and iridium? These considerations have sparked a resurgence in catalysis using 3d-metal compounds.

Given the context, the primary scientific objective of this project is to explore the catalytic potential of manganese and nickel complexes in processes aimed at producing a variety of organometalloidal compounds of silicon, boron, and germanium. Under the proposal, we plan to synthesize a diverse array of coordination compounds involving manganese and nickel. These compounds will feature ligands based on 1,4-diazine, and 1,3,5-triazine. The resulting complexes will facilitate the creation of organometalloidal compounds that merge organic and inorganic components into a hybrid structure with distinct properties. Additionally, the project includes an in-depth examination of the mechanisms governing these transformations, marking a pivotal stride toward fostering sustainable chemical synthesis.