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**Abstract of the Doctoral Dissertation entitled:
"Fuel additives based on polyalcohol acetalization products on
nanocatalytic Re doped Os, Mo, Ru and Ir"**

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The synthesis of acetals can be carried out in many ways, particularly from carbonyl compounds and (poly)alcohols, from vinyl ethers, in the reaction of phenols with allyl ethers or other reactions. Acetals are used as pharmaceuticals, fragrance additives for cosmetics, food and biofuels, especially biodiesel.

The study aimed to develop new procedures for synthesizing cyclic acetals from alcohols and carbonyl compounds using nanocatalysts of Re doped with Os, Mo, Ru and Ir and test the obtained library of compounds as potential fuel additives according to the concept of green chemistry and environmental protection.

The investigations optimized the Re/SiO₂ system as an economic catalyst for transforming polyols into acetals under mild solvent-free conditions. During the research, the basic physicochemical parameters of synthetic acetals were determined, such as density, viscosity, isentropic compressibility, isobaric thermal expansion, cetane number and other parameters typically used in the characteristics of fuel compositions.