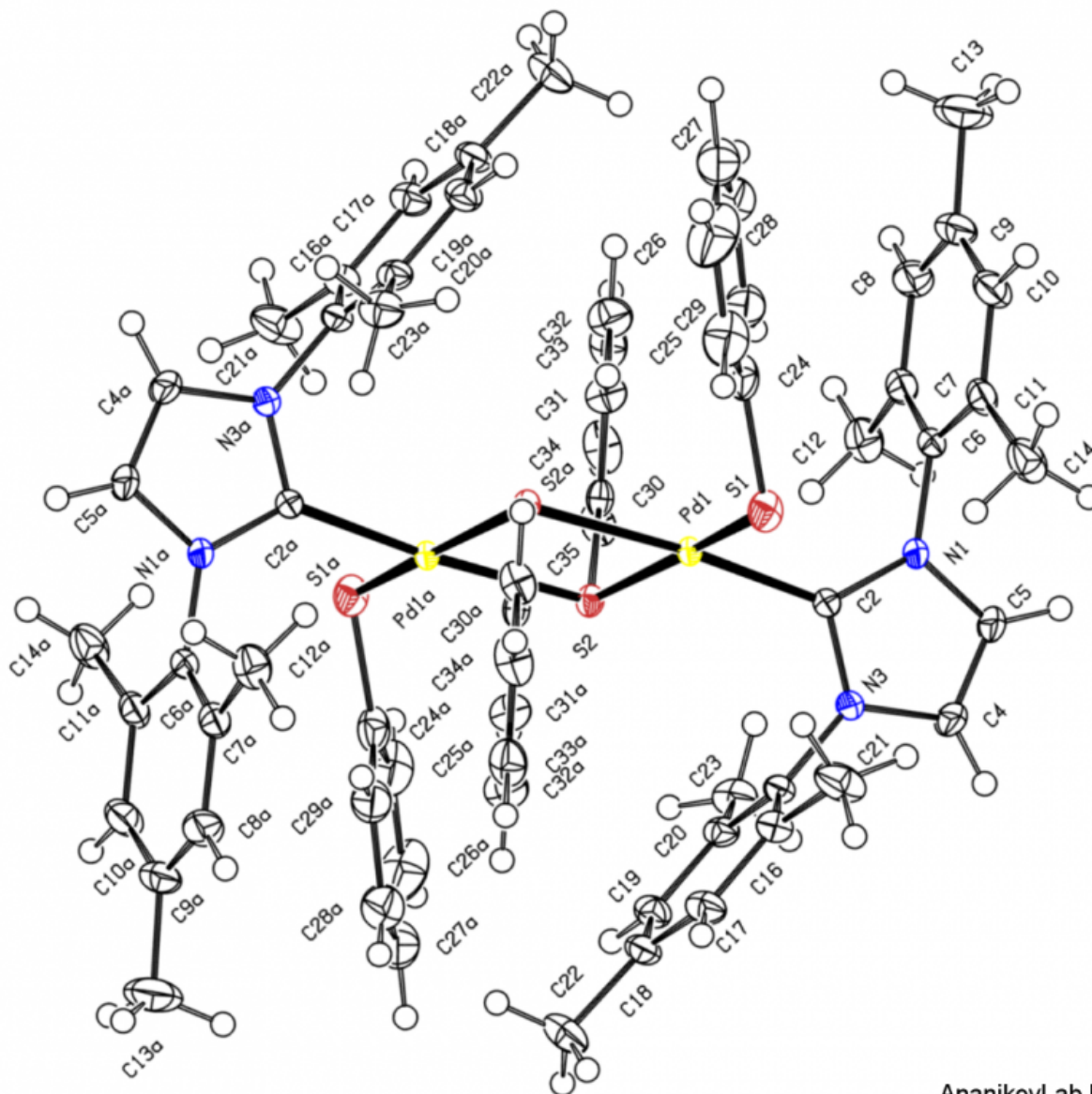


# Strong odour challenge of mercaptans

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Figure 1: A unique four-membered Pd<sub>2</sub>S<sub>2</sub> ring created in the catalytic chemistry

Mercaptans or thiols are a special class of organic compounds that contain sulfur functional group RSH. Various sulfur compounds are sought for the formation of new materials in photonics, optics, the pharmaceutical industry, organic chemistry, and nanotechnology.

Sulfur derivatives are, by far, the richest fossil source of functional molecules available in nature. Indeed, a diversity of sulfur species is present as contaminants in [crude oil](#). Unfortunately, there are still no efficient technological tools to separate sulfur compounds from crude oil and utilize them in materials production, and the petroleum industry wastes billions of tons of valuable compounds annually.

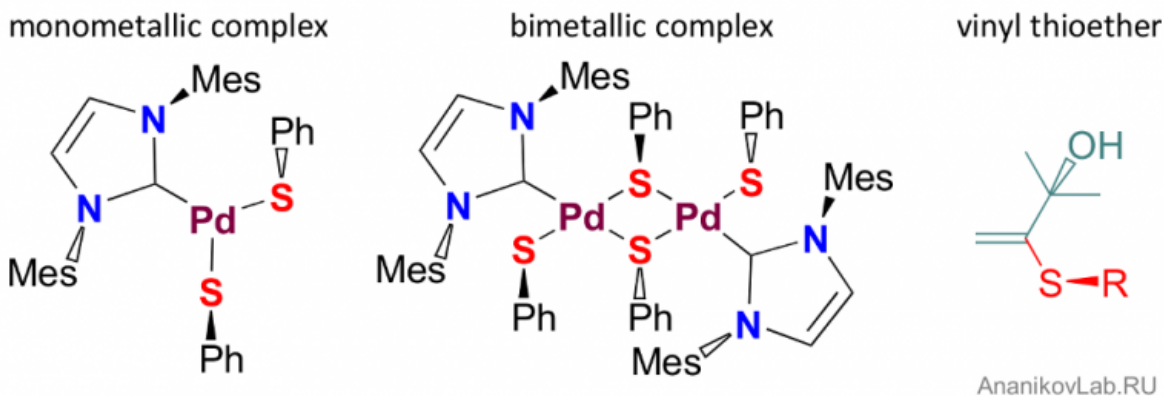
It is a well-known fact that humans are very sensitive to thiols. Small molecular thiols have an extremely unpleasant smell, which even in trace-level concentration (1 to 5 parts per billion) can be easily detected by human's nose.

A unique palladium catalyst was developed in the laboratory of Prof. Ananikov at the Zelinsky Institute of Organic Chemistry, Russian Academy of Sciences. A Pd complex with an NHC ligand produced chemical transformations of thiols into vinyl monomers, a useful component for the new generation of polymeric materials. Even challenging EtSH and PrSH thiols were involved in the reaction with excellent outcomes.

Chemical transformation was performed using an atom-economic approach, which assures high yield and complete selectivity. This means that a pure product can be obtained just after completion of the reaction and isolation of the catalyst.

Mechanistic studies have revealed the nuclearity of transition metal complexes (Figure 2) in the catalytic cycle. Monometallic Pd complex mediated quick reaction, but bimetallic Pd complex reacted much

slower. The mechanistic findings are connected to the catalyst evolution problem and to the role of nucleation to nanoparticles revealed by this group earlier.



Tricky sulfur chemistry at the glance.

Upon addition to alkynes, thiols were efficiently converted to vinyl thioethers—stable monomers, which are easy to handle and do not have an unpleasant odour.

Here comes the logical solution to many chemical dilemmas: The right catalyst may turn even unpleasant chemicals into valuable products.

The article "Pd-NHC Catalytic System for the Efficient Atom-Economic Synthesis of Vinyl Sulfides from Tertiary, Secondary, or Primary Thiols" by Evgeniya Degtyareva, Julia Burykina, Artem Fakhruddinov, Evgeniy Gordeev, Victor Khrustalev, and Valentine Ananikov was published in *ACS Catalysis* journal published by American Chemical Society.

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[10.1021/acscatal.5b01815](https://doi.org/10.1021/acscatal.5b01815)

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[10.1021/jo402038p](https://doi.org/10.1021/jo402038p)

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