

Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Budker Institute of Nuclear Physics SB RAS, Novosibirsk, Russia
Topchiev Institute of Petrochemical Synthesis RAS, Moscow, Russia

XAFS study of stable bimetallic catalysts for selective hydrogenation of furfural

Kriventsov V.V., Volodin A.M., Novgorodov B.N., Zyuzin D.A., Aksenov D.G., Ivanov D.P., Nikolaev S. A., Chistyakov A.V.

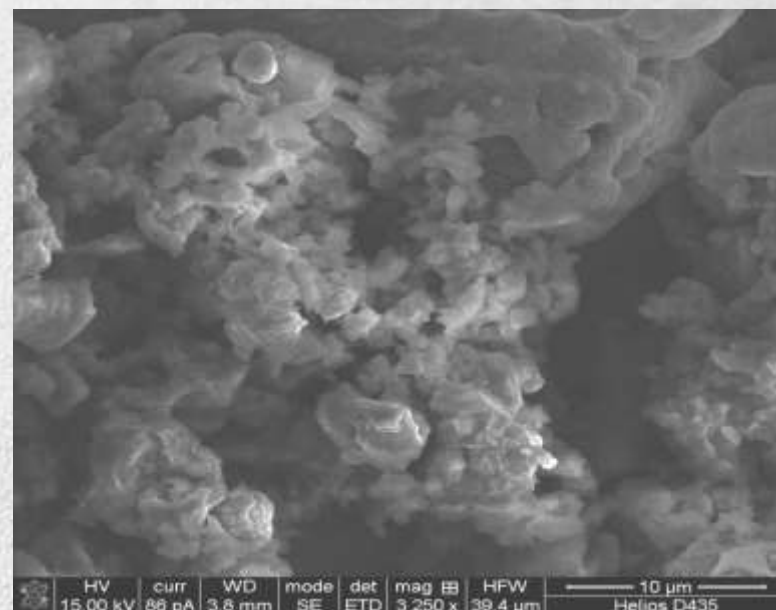
The International Conference “Synchrotron and Free electron laser Radiation”: generation and application”, July 13 – 16, 2020

- Today catalytic reaction of the selective hydrogenation of furfural is perspective way to create of motor fuel components and products with high added value. Unfortunately existing catalysts providing high conversion of the initial furfural have not sufficiently high selectivity for the target products (70-80%), which indicates the need to develop new significantly more active and selective catalysts with high stability. In this connection, the search for correlations between structural features and the charge state of metals in deposited bimetallic clusters and their catalytic activity and selectivity in the process of selective hydrogenation of various functional groups of the furfural molecule is an urgent research task. This presentation is devoted by a study of the state and local structure of the active component of Ru-Sb model catalysts for selective hydrogenation of furfural by XAFS (XANES/EXAFS). The catalysts were prepared by sol-gel from organic and inorganic mono- and bimetallic complex precursors. All XAFS spectra were recorded at SSTRC, Novosibirsk. The genesis of local structures and state metals for the prepared nano-structured catalysts were studied in detail. The interatomic distances and corresponded coordination numbers were determined. All possible structural models were discussed. The obtained XAFS results are in good agreement with XRD, EDX and SEM data.

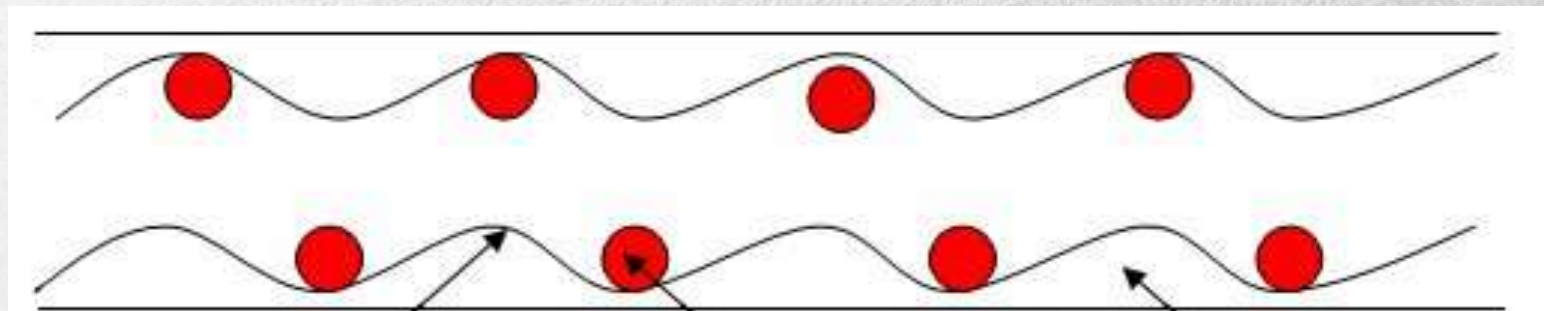
Reactor for the selective hydrogenation of furfural



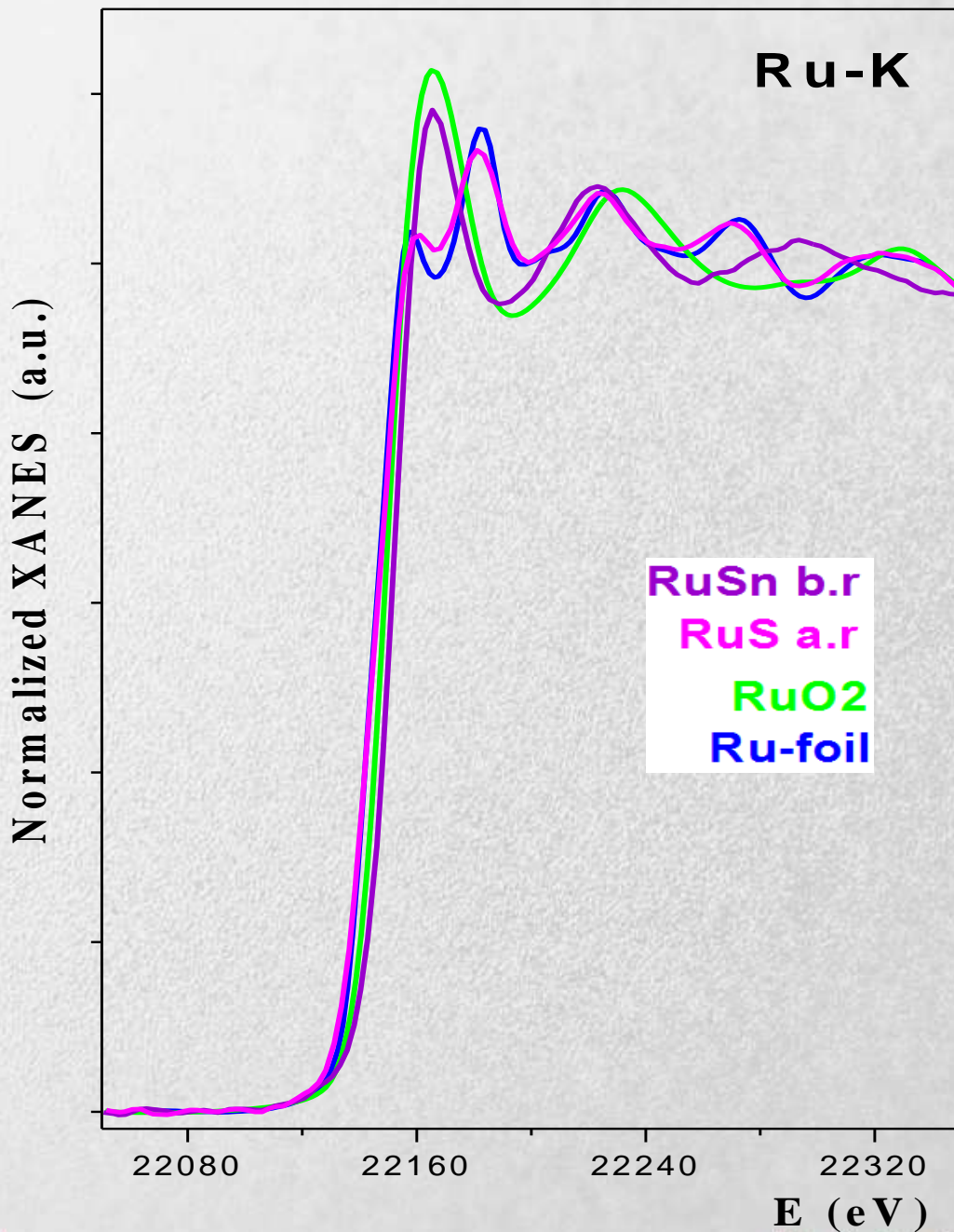
SEM data of inner space of RuSn catalyst



Model of active component of RuSn nanosystem



XANES (Ru-K) spectra
of studied samples: 1)
RuSn b.r., 2) RuSn
a.r., 3) RuO₂, 4) Ru -
mesh



Curves of radial distribution function of atoms (RDFs) describing of Ru local arrangement for studied samples: 1) RuSn b.r., 2) RuSn a.r., 3) RuO₂, 4) Ru - mesh

