Structural study of Pt-complexes in aqueous solution by EXAFS

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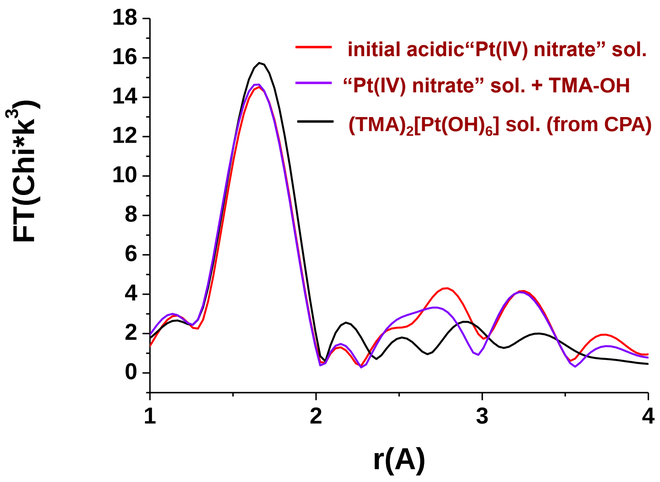
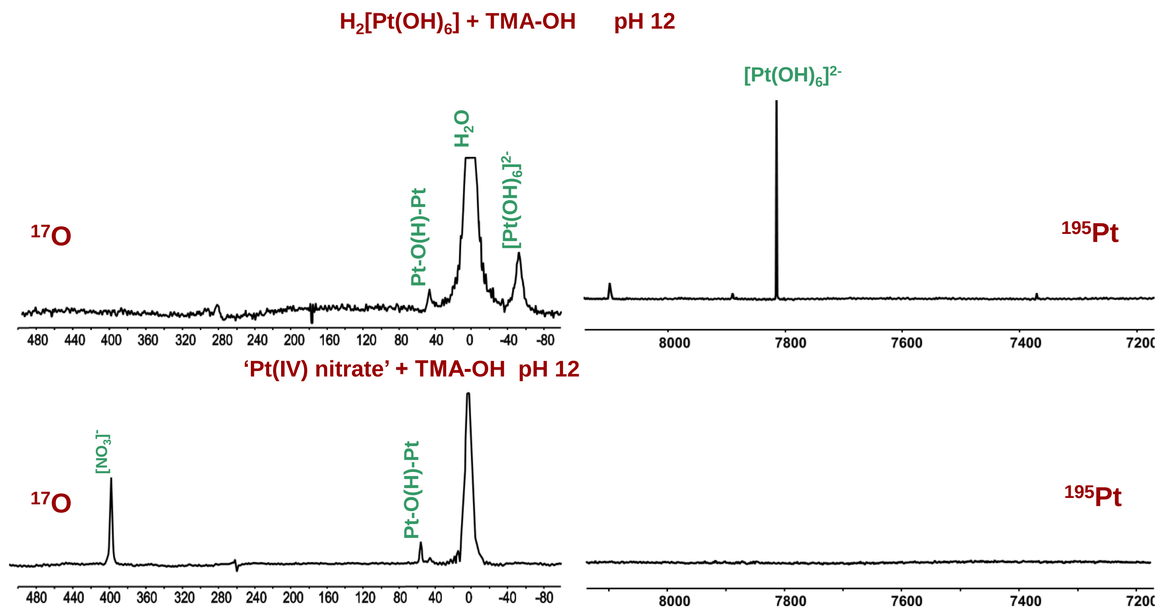
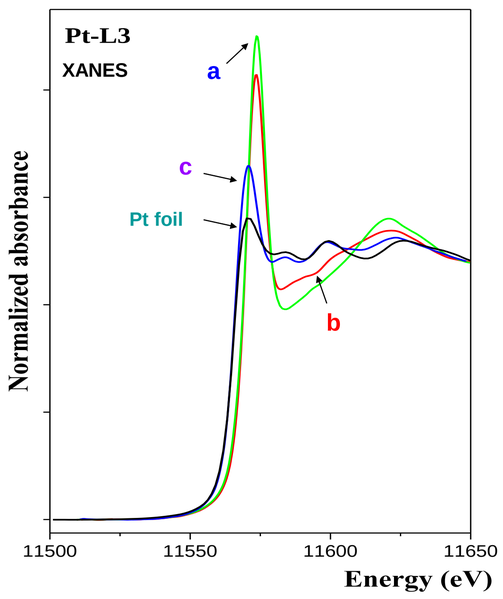


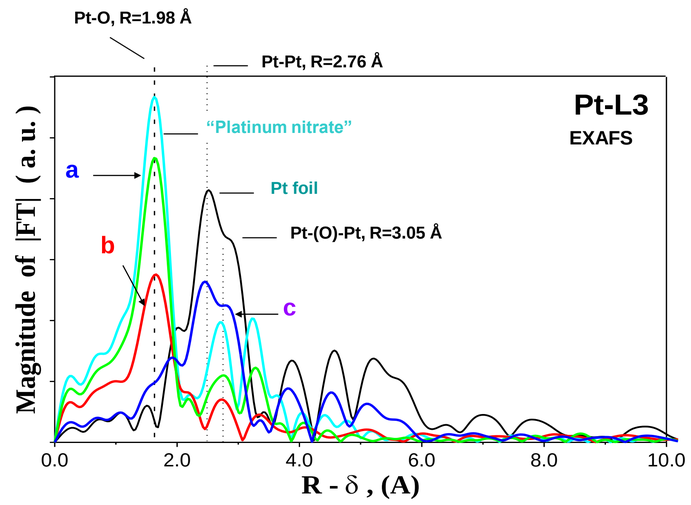
The two peaks centered around ~3.0 Å are distinctly presented on parent acidic and derived alcaline Pt nitrate solutions. These two peaks were ascribed to corresponded Pt-Pt distances ~ 3.0 and 3.8 Å outside the range expected for direct Pt–Pt bonding, suggesting that two Pt atoms are linked through bridging OH ligands. The same two but spread peaks are hardly ever seen on the RDF curve obtained by EXAFS for mononuclear alcaline $[Pt(OH)_6]^{2-}$ reference solution.



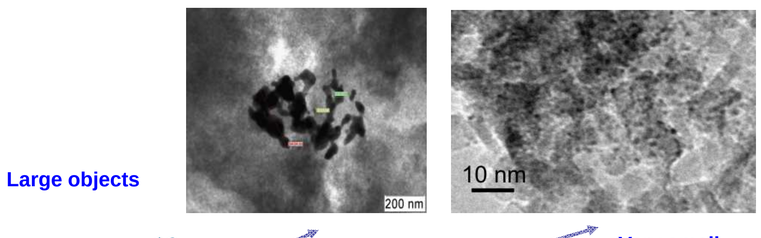
Unlike CPA solution, alkalization of commercial ‘Pt(IV) nitrate’ solutions does not lead to light-yellow $M_2[Pt(OH)_6]$ solution and the cleavage of bridged OH ligands stabilizing oligomeric Pt nitrate complexes does not occur even after prolonged refluxing with excess of alkali

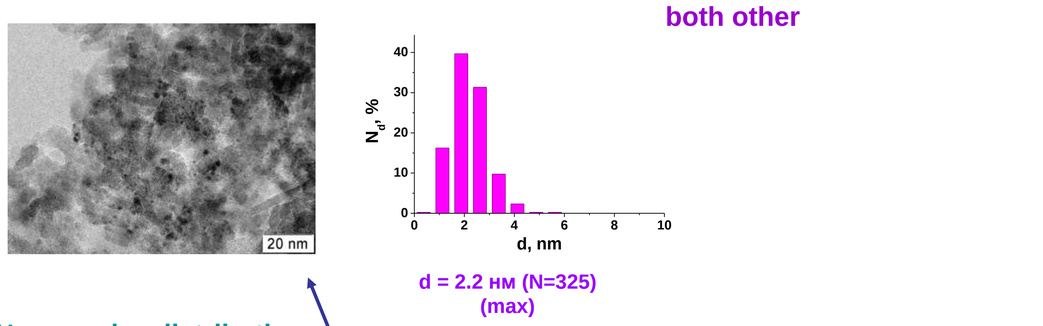
The white line intensity and absorbanse edge shift clearly indicated the difference in oxidation state for small Pt particles on alumina prepared from acidic (a) and alcalized (b) platinum nitrate precursors (calcination 400°C) as well as for large Pt particles (c) resulting from 500°C calcination.





The local environment of Pt in small particles (< 5 nm) on alumina prepared from acidic platinum nitrate was similar to the precursor solutions. The larger nanoparticles (> 6 nm), formed due to high-temperature (500°C) calcination, are mostly metallic. The Pt particles prepared from alcalized platinum nitrate differs from both other





“Pt(IV)-nitrate” solutions are widely used as precursors for mobile and stationary emission control catalysts for being chlorine-free but are unfit for the preparation of highly dispersed catalysts

The alcalization of commercial “Pt(IV)-nitrate” solutions gives stabilized precursor solution fit for the preparation of highly dispersed Pt-Me/C catalysts

The work was done using the infrastructure of the Shared-Use Center “Siberian Synchrotron and Terahertz Radiation Center” based on VEPP-3 of BINP SB RAS.