Effect of structural parameters on electrical properties of vanadate layers

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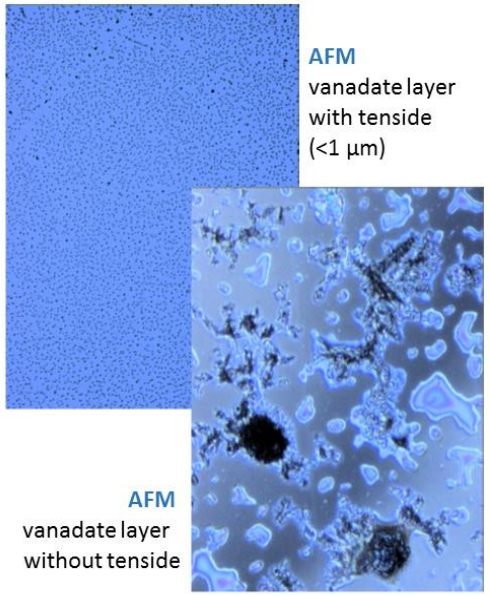
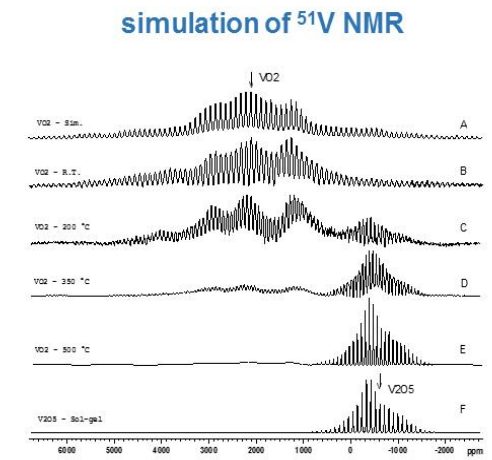
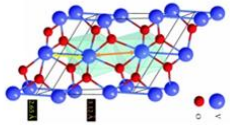




(Simulated VO_2 spectrum, (B) VO_2 at room temperature, (C) VO_2 heated at 200 °C, (D) VO_2 heated at 350 °C, (E) VO_2 heated at 500 °C, (F) sol-gel derived V_2O_5



α-VO_2

Knight-shift

VO_2 simulation data	
δ(iso)	2102 ppm
δ(CSA)	1356 ppm
η(CSA)	0.8
CQ(Quad)	4.71 MHz
η(Quad)	0.50
Euler α	165°
Euler β	5 °
Euler γ	36 °
LB	4850 Hz
MASR	14 kHz
NSB	50

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Synthesis : In the sol-gel synthesis a colloidal solution of pH 2 is prepared from aqueous solution of NH_4VO_3 by addition of various acids (nitric, acetic, citric acids) or by means of cation exchange. The developed H_3VO_4 is already capable to condensate. After treatments at RT, 70, and 400˚C the layers can be formed by dip coating. For comparison V_2O_5 was melt at 800˚C and dispersed in water to get a sol.

Scientific Goal: Development of a cost-effective synthesis for vanadate layers with variable thickness and excellent electrical properties is aimed. Important task is to investigate the effect of structural parameters on the electrical properties .

Result: According to experiments until now the best synthesis proved to be the use of ion exchange and tenside. By this way homogeneous thin layer can be produced. Solid state ^{51}V MAS NMR is found suitable to identify the V^{4+} and V^{5+} oxidation states and their chemical environment.