



*nanomaterials*

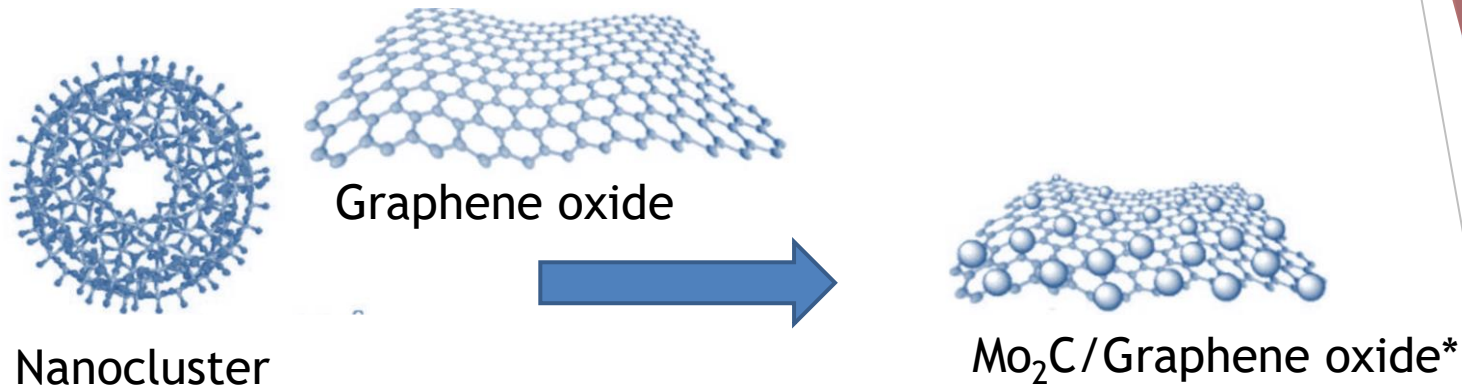


# Molybdenum-tungsten blue nanoparticles as a precursor for ultrafine binary carbides

Maria Myachina \*, Natalia Gavrilova, Ksenia Poluboyarinova, Victor Nazarov  
*D. Mendeleev University of Chemical Technology of Russia, Moscow, Russia*  
e-mail: [mmyachina@muctr.ru](mailto:mmyachina@muctr.ru)

# Molybdenum-tungsten blue nanoparticles - precursor of ultrafine $\text{Mo}_2\text{C}$ - $\text{W}_2\text{C}$

- Small size of precursor particle - ultrafine carbide



- Molybdenum-tungsten nanoparticle - single phase carbide of molybdenum and tungsten

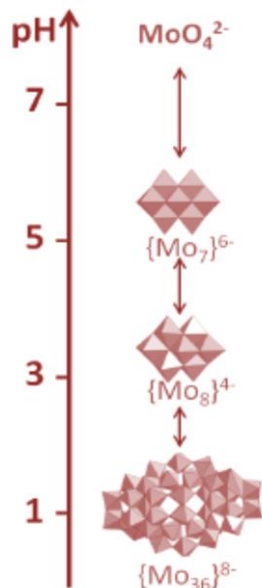
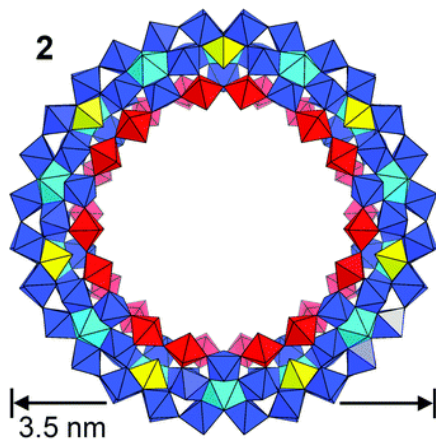
Mixed precursor of Mo and W carbide



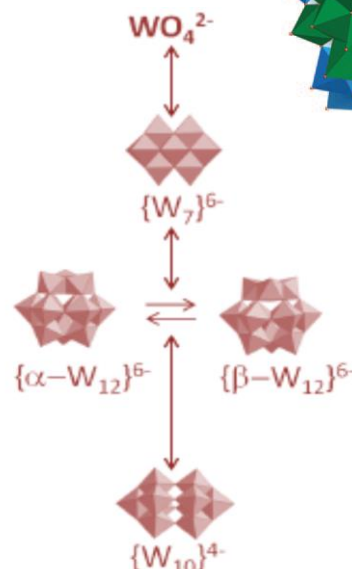
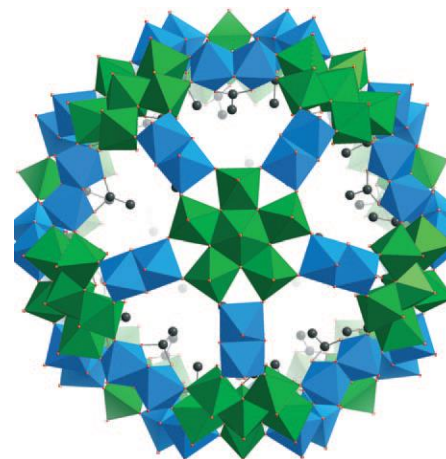
**SOLID SOLUTION**  
 **$\text{Mo}_2\text{C}$ - $\text{W}_2\text{C}$**

# Polyoxometalate nanocluster

$\{\text{Mo}_{138}\}$ -3,5 nm,  
toroidal shape\*

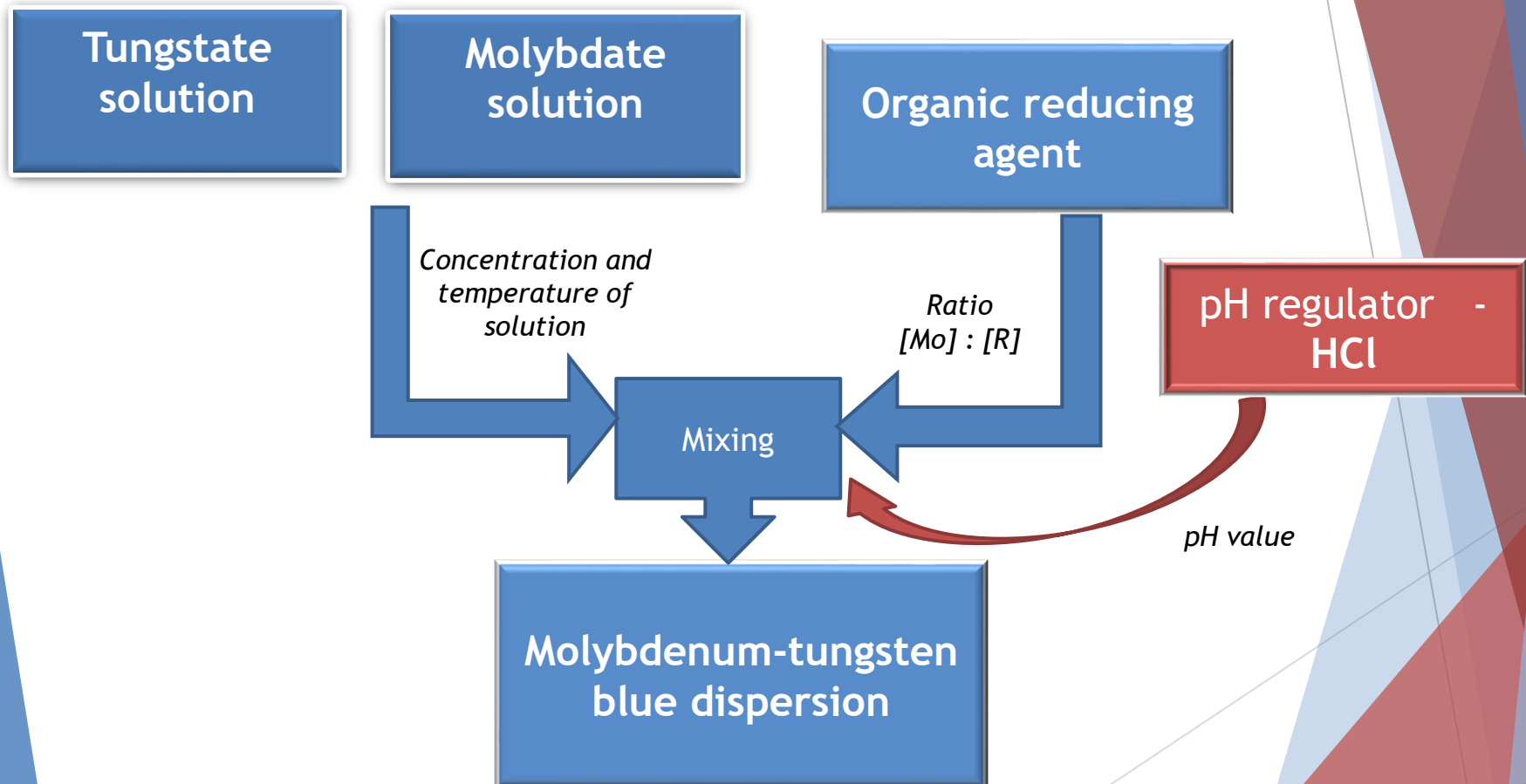


$\{(\text{W})\text{W}_5\}_{12}\{\text{Mo}_2\}_{30}$   
keplerate\*\*

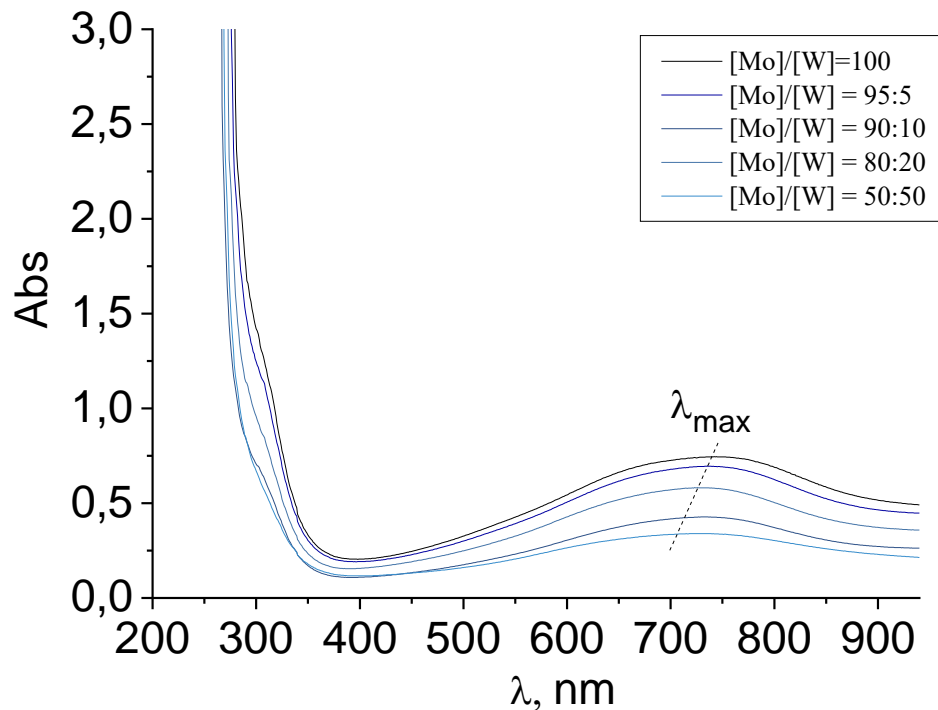


- \*Müller A., Serain C. Polyoxometalates: From Platonic Solids to Anti-Retroviral Activity // Acc. Chem. Res. 2000. V. 33. P. 2.
- \*\* Scaffer C., Merca A., Bogge H., et al. Unprecedented and Differently Applicable Pentagonal Units in a Dynamic Library: A Keplerate of the Type  $\{(\text{W})\text{W}_5\}_{12}\{\text{Mo}_2\}_{30}$ //Angew. Chem. Int. Ed. 2009. V. 48.P.149.

# Synthesis of molybdenum-tungsten blue dispersions



# Synthesis of dispersions

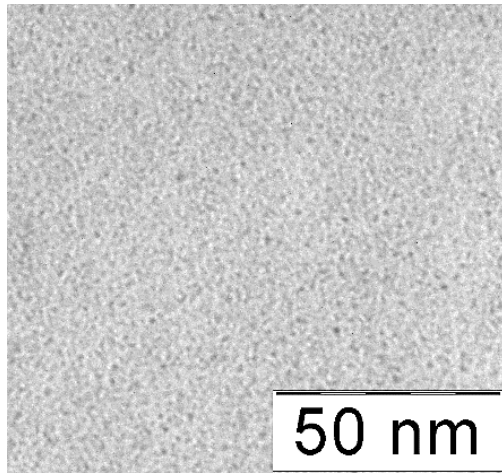


The electronic absorption spectrum of molybdenum – tungsten blue dispersions

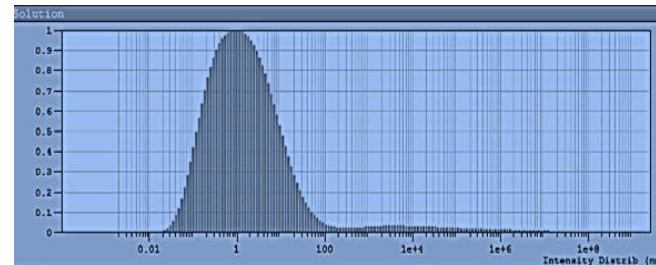
## Molar ratio [Mo] / [W]:

- 100 ← molybdenum blue dispersion
  - 95/5
  - 90/10
  - 80/20
  - 50/50
- ← molybdenum-tungsten blue dispersion

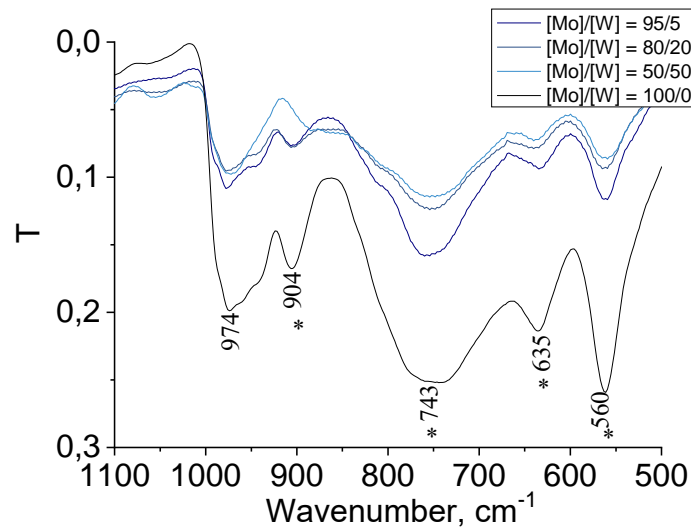
# Molybdenum-tungsten nanoparticles



TEM-image of molybdenum-tungsten blue nanoparticles



DLS distribution of molybdenum –tungsten blue nanoparticles



FTIR spectra of molybdenum-tungsten nanoparticles isolated from dispersions



# Thank you for attention !



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