



# Synthesis process of inorganic nanoparticles

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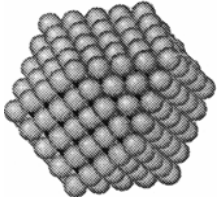
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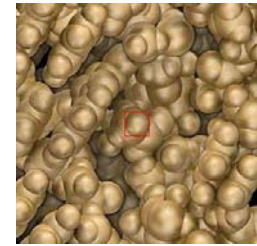
Instituto de Investigaciones en Materiales.

# Outline

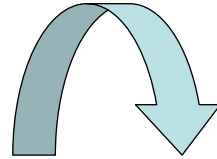
- Nanoparticles.
- Techniques of Synthesis.
- Ru-Sr-Gd-Cu-O system.
- Sr-Fe-(Mo,Re)-O system.
- CeO<sub>2</sub> compound.
- MNbO<sub>3</sub>, M = Li, K, Na system.
- AConO<sub>y</sub>, A = Li, Na, K, Ca and Sr and n = 1, 2, 4 system.



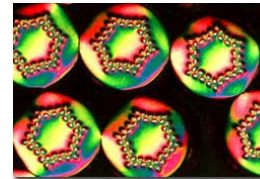
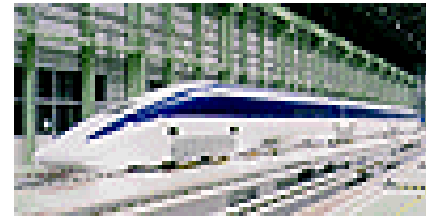
# Nanoparticles



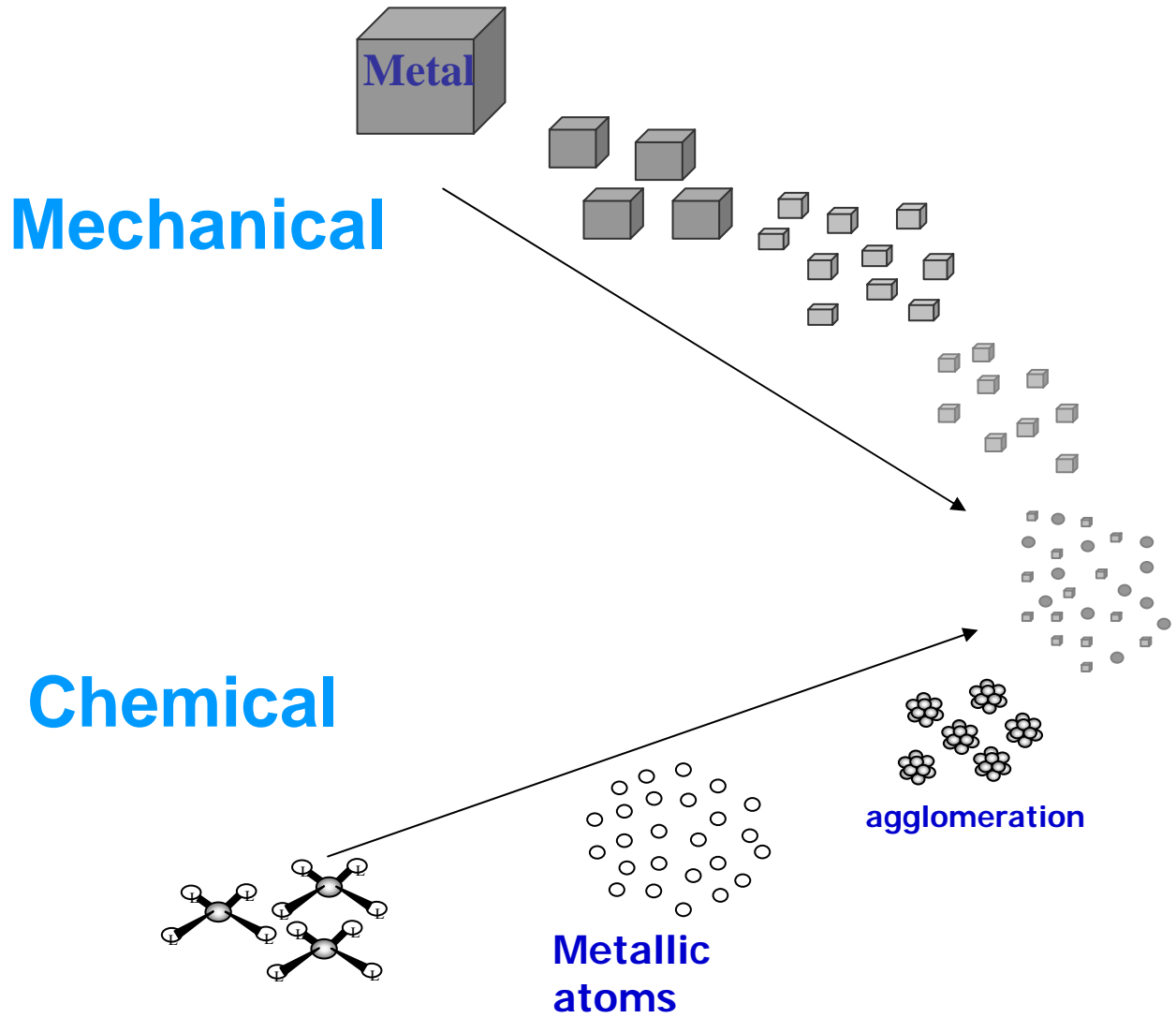
HIGH IMPACT:




- Superconductivity.
- Catalysis.
- Electric properties.
- Magnetic properties
- Thermoelectric properties.
- Optical properties.



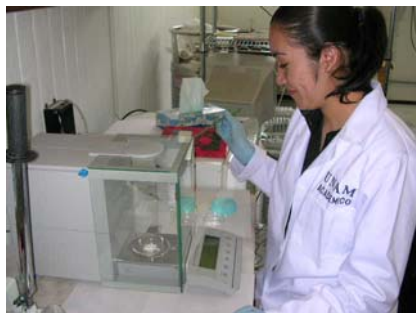
# Synthesis techniques of nanoparticles.



# Chemical synthesis:

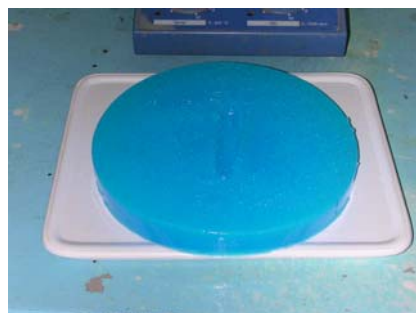
- Sol-gel polymerized by acrylamide via microwave. 
- Hydrothermal synthesis.
- Decomposition of organometallic precursors.

# Sol-gel polymerized by acrylamide via microwave.



sol

pH



gel



acrylamid

# Continuation of the chemical process of Sol-gel polymerized by acrylamide via microwave.

gel



micro oven



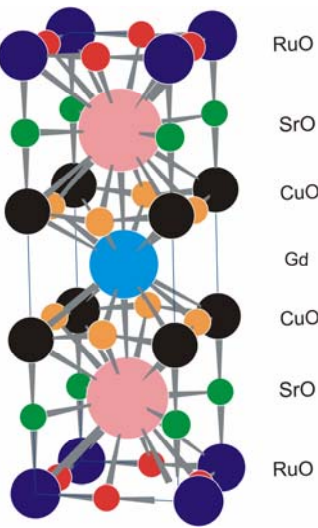
xerogel



# Preliminary results.

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RuO  
SrO  
CuO  
Gd  
CuO  
SrO  
RuO

# Ru-Sr-Gd-Cu-O system.

$(Ru, Cu)-Sr-Gd-Cu-O$ .

$Ru-(Sr, Ca)-Gd-Cu-O$ .

$Ru-Sr-(Gd, Ln)-Cu-O$ :  $Ln = Dy, Ho, Er, Y$  and  $Lu$ .

Prepared by sol-gel gelation with acrylamide via microwave.

Orthorhombic cell  
P4/mmm

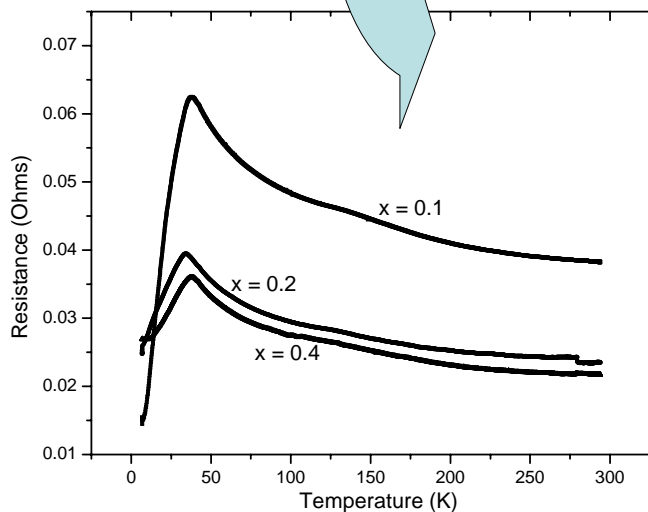


Fig. 5. R vs T for  $Ru_{1-x}Sr_2GdCu_{2+x}O_8$  system

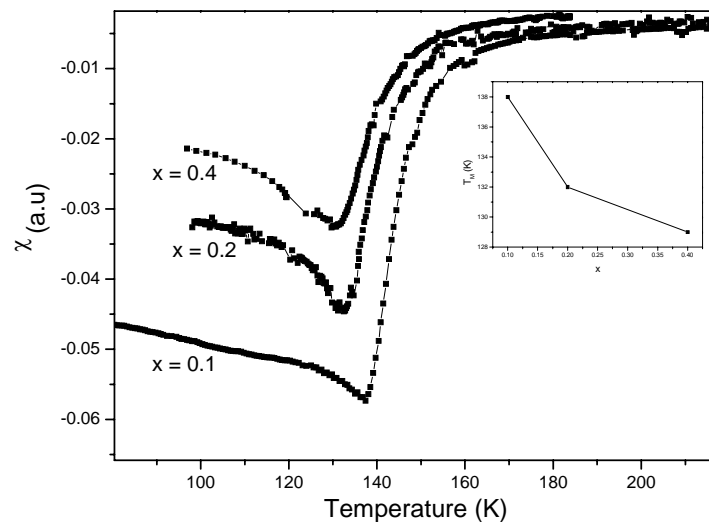
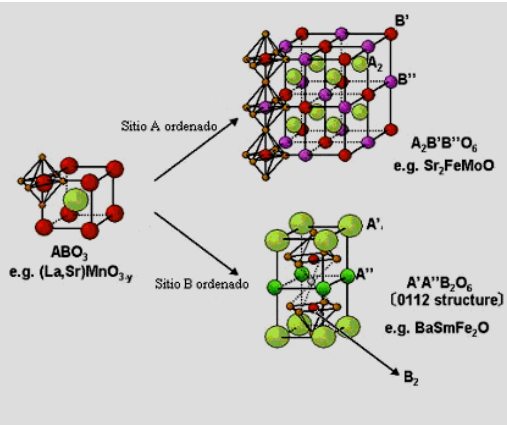
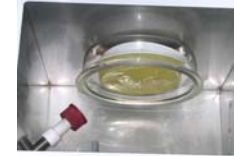


Fig. 7.  $\chi_{ac}$  vs T of  $Ru_{1-x}Sr_2GdCu_{2+x}O_8$

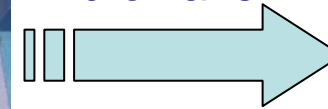
# Sr-Fe-(Mo,Re)-O system.



Gel



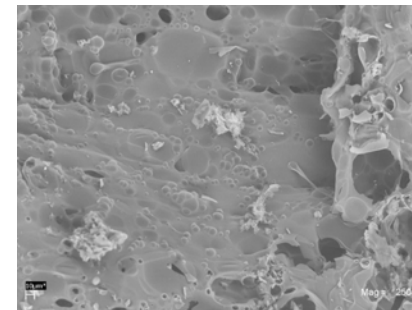
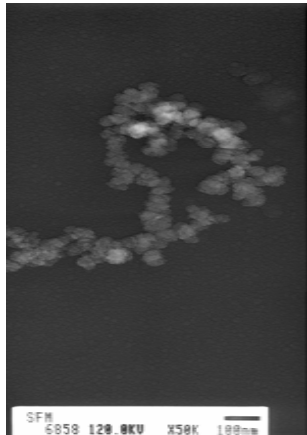
Microwave



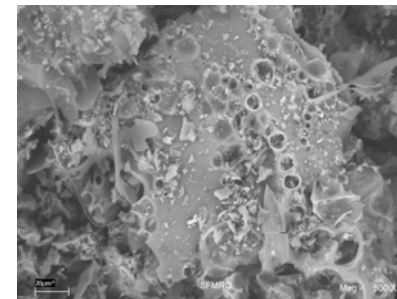
Sol



20-60 nm

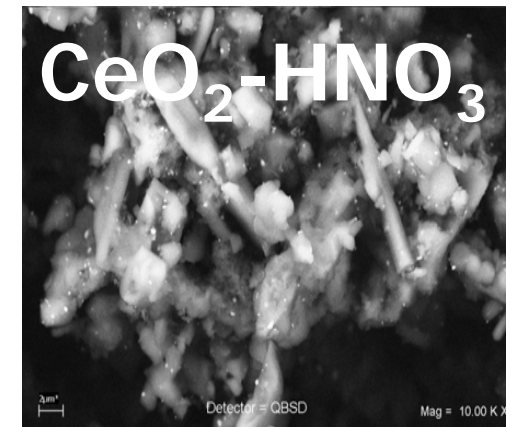
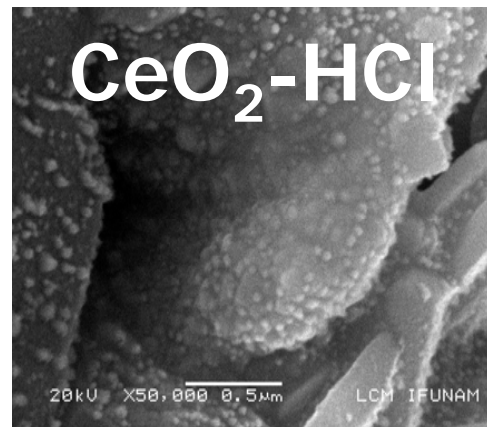
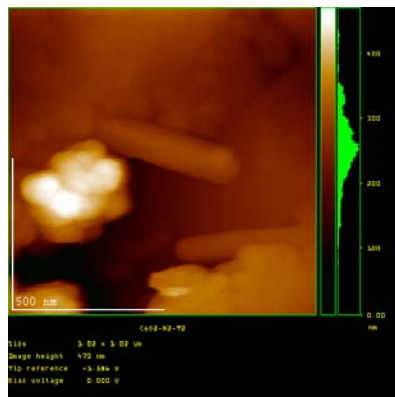
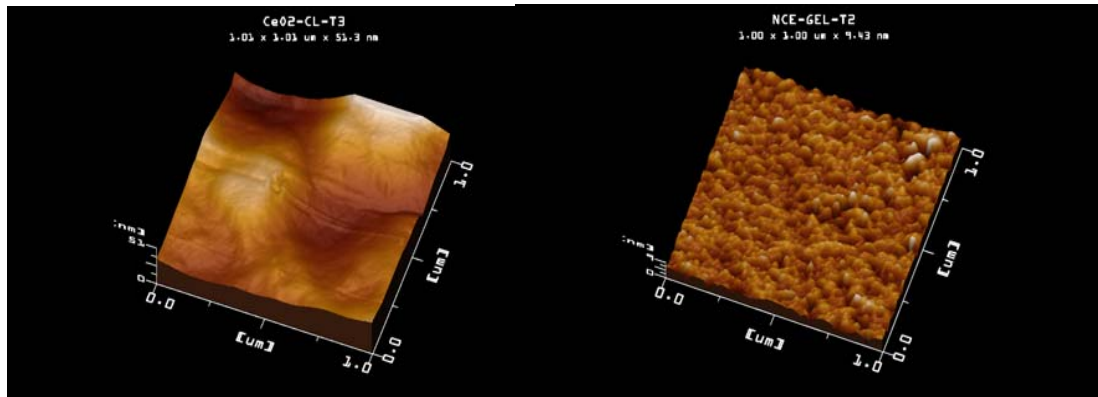


Xerogel



# CeO<sub>2</sub> cubic compound.

Prepared by sol-gel  
gelation with acryla  
via microwave.



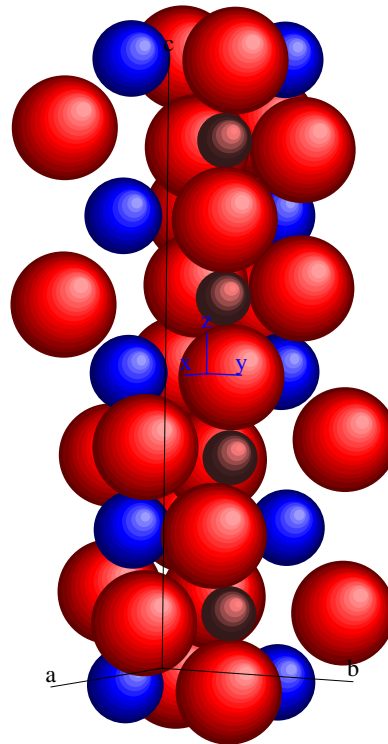
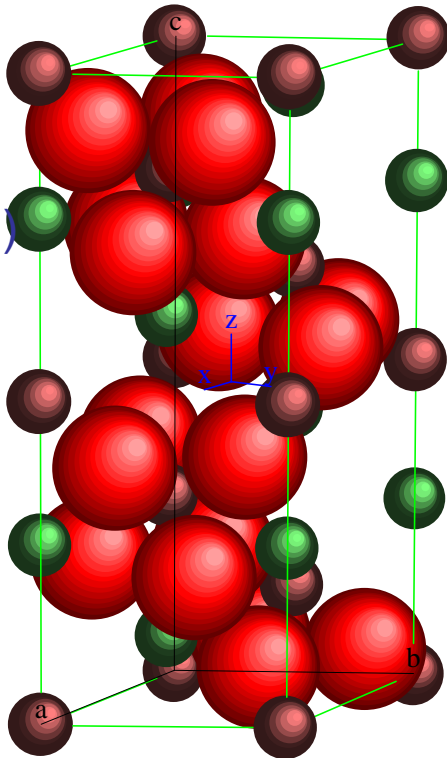
# MNbO<sub>3</sub>, M = Li, K, Na system.

Sol-gel polymerized by acrylamide via microwave.

Hydrothermal synthesis.

LiNbO<sub>3</sub>

R3c (161)

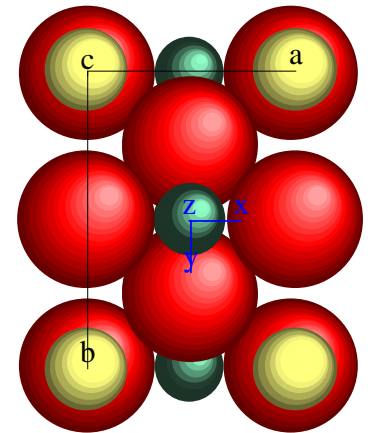


NaNbO<sub>3</sub>

Pbcm (57)

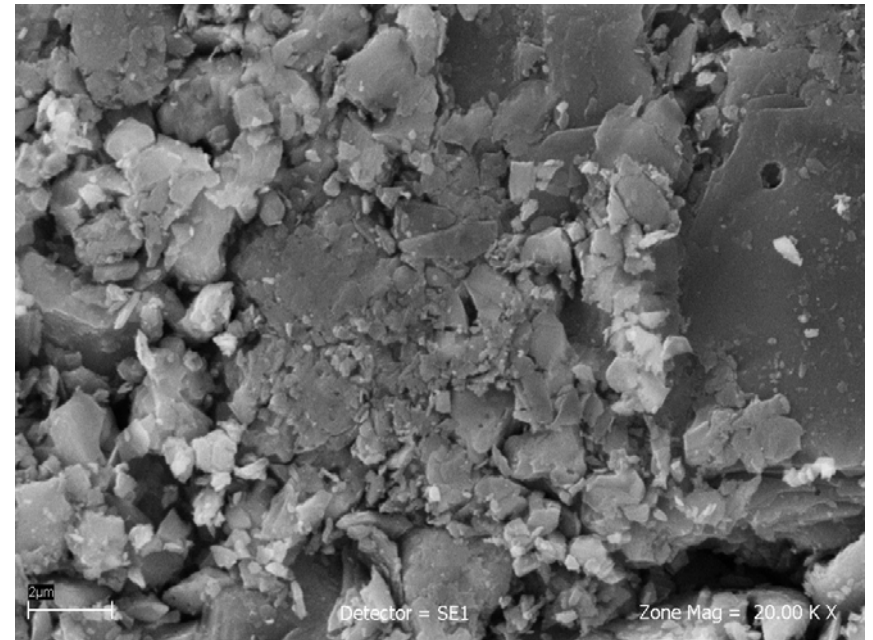
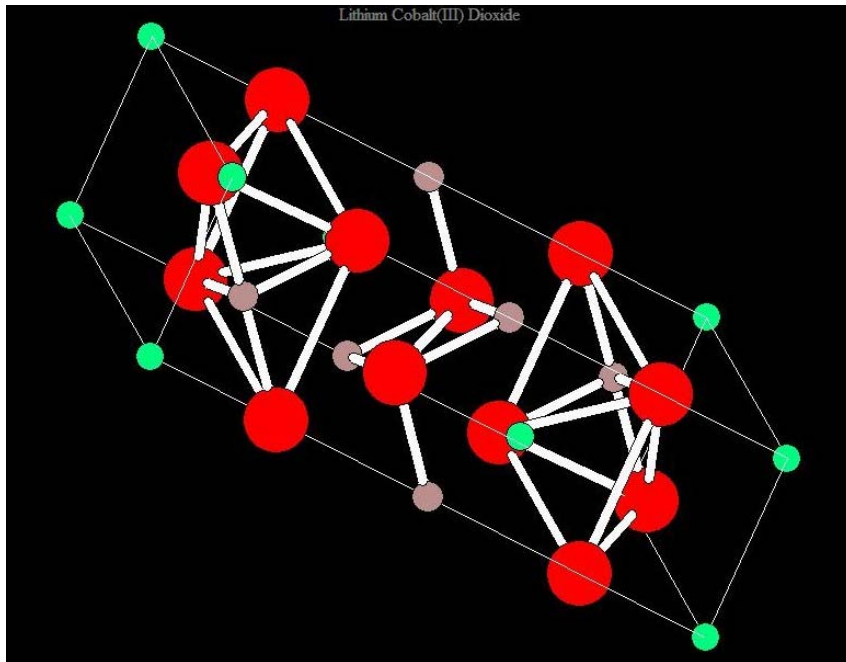
KNbO<sub>3</sub>

Amm2 (38)



$A\text{Co}_n\text{O}_y$ ,  $A = \text{Li, Na, K, Ca}$  and  $\text{Sr}$   
and  $n = 1, 2, 4$  system.

$\text{LiCoO}_2$



# Collaborators

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