# *Nanomaterials from NANOMAT – Manufacturing, Processing, and Applications*


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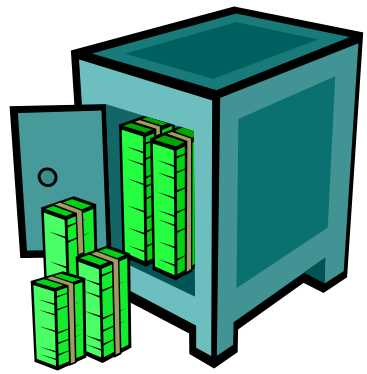
# *Why Nanomaterials?*

- ***New Technologies***
- ***New Products***
- ***New Markets***
- ***Financial Rewards***



# *What are Nanomaterials?*

- Nanoparticles and nanostructured materials
- Grain size on the order of $10^{-9}$ m or nm
- Extremely large specific surface area
- Manifest fascinating and useful properties
- Structural and non-structural applications
- Stronger, more ductile materials
- Chemically very active materials

# *Benefits of Nanomaterials*

- ✓ Tunable/tailorable chemical, mechanical, and physical properties due to extremely fine grain size (1-100 nm)
- ✓ Superior formability and potential superplasticity
- ✓ Possess high strength, toughness, and ductility
- ✓ Possess enhanced activity (extremely large specific surface area)
- ✓ Reduced thermal conductivity
- ✓ Dispersoids can be utilized to further increase strength
- ✓ Reduced energy costs

# *Representative Applications*

- Biomedical Devices
- Drug-delivery
- Flat-panel displays
- Medical Imaging
- High-energy batteries
- Sensors
- Paints and pigments
- Automobile components
- Formable ceramics
- High-power magnets
- Smart structures
- CMP slurries
- KE penetrators/warheads
- Catalysts
- Phosphors
- Dielectrics
- Fuel cells
- Optical devices
- Cutting tools
- Cosmetics
- Aerospace components
- ***Proprietary Applications***

# *Why NANOMAT, INC.?*

- ***Process Capabilities***
- ***Production Facilities***
- ***Analytical Capabilities***
- ***Variety of Products***
- ***Stability and Profitability***

# NANOMAT, INC. Core Competency

***Experts at manufacturing virtually any nanomaterial by Chemical, Mechanical, Physical, and Combinations thereof***

- ***Sol-Gel Synthesis***
- ***Plasma Synthesis***
- ***Polyol and other Chemical Synthesis***
- ***Hydrothermal Synthesis***
- ***Mechanical Alloying***
- ***Mechanochemical Synthesis***
- ***Other Proprietary Methods (Chemical, Mechanical, and Physical)***

# NANOMAT, INC.'s Facilities

- 45,000 ft²
- Chemical synthesis
- Mechanochemical synthesis
- Mechanical alloying
- Plasma synthesis
- Transmission electron microscope
- Scanning electron microscope with EDS
- FT-IR/UV-*Vis* Spectrometers
- Mass Spectrometers
- Metallograph
- Universal testing machine
- Mechanically-fluidized vacuum (MFV) furnaces
- X-ray diffractometer
- High-Temperature S DSC/DTA/TGA
- 75-ton hot-press
- High-temperature atmosphere and vacuum furnaces
- Many more

# *NANOMAT, INC. Background*

- ***Age of Company:*** ***Founded in 1995***
- ***Number of Employees:*** ***25, to be 28 in the next two months***
- ***Annual Revenue:*** ***Confidential***

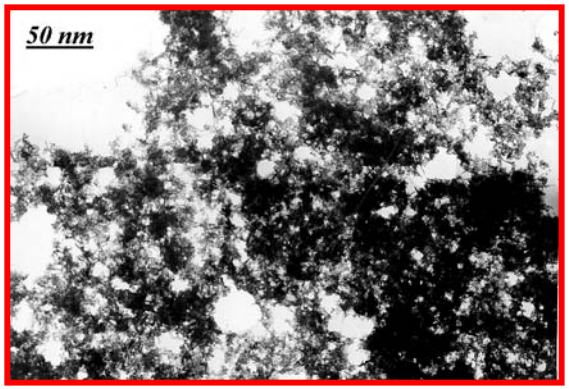
- ***Approximate Revenue Breakdown:***

  **90-95%** – *Commercial Sales*

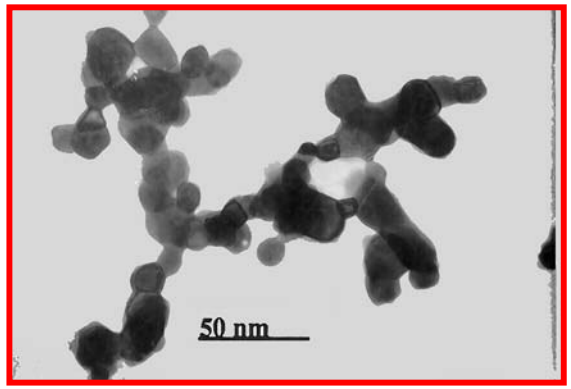
  **5-10%** – *Government and other R & D Contracts/Grants*
- ***Ownership and Management***

  ***All employees are stockholders in the subsidiaries***

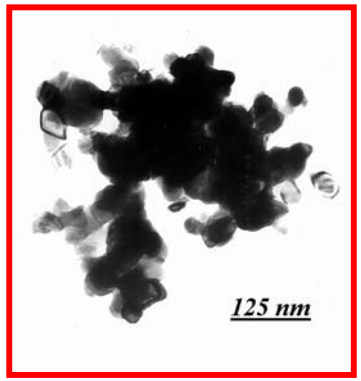
# Nanomat Products



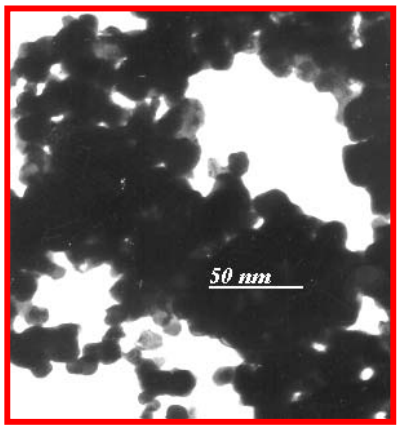

Tungstic acid gel




Elemental tungsten

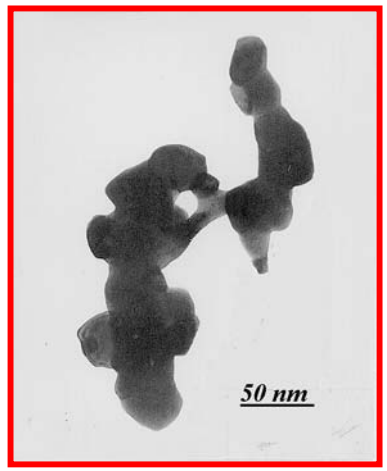



W-Mo Solid Solution



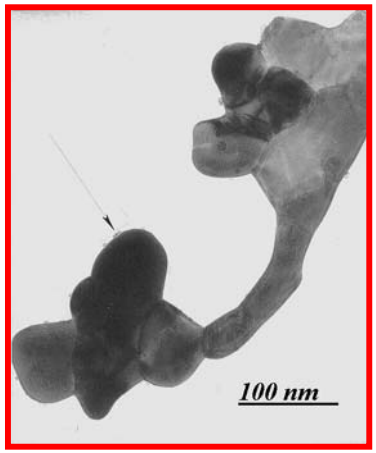

W-Ta Solid Solution


W-Re alloy

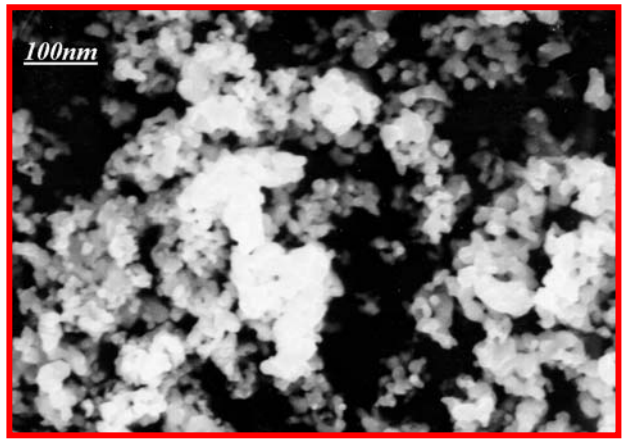



W-Ni alloy

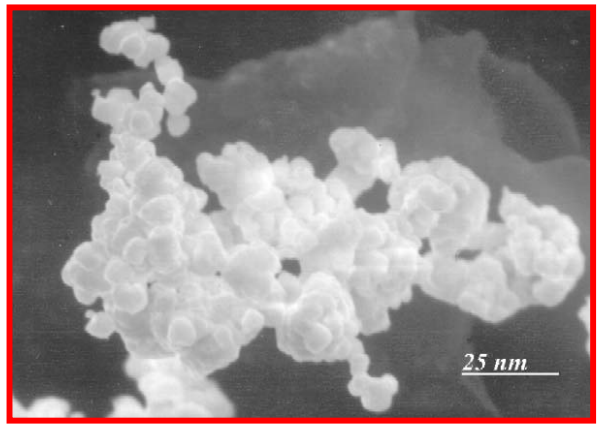
# Nanomat Products



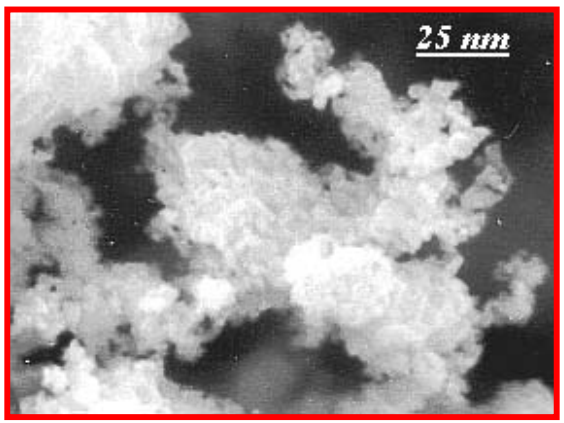

Cu-coated W



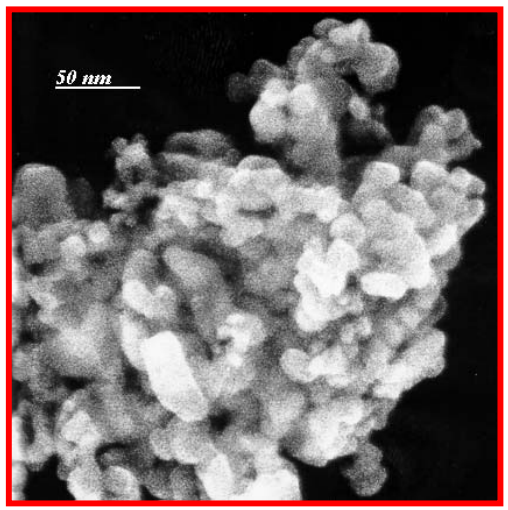

WC-Co



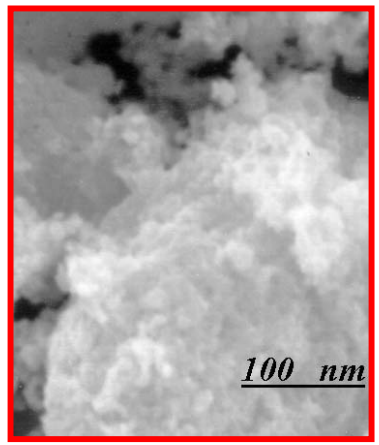

AlN




$B_4C$

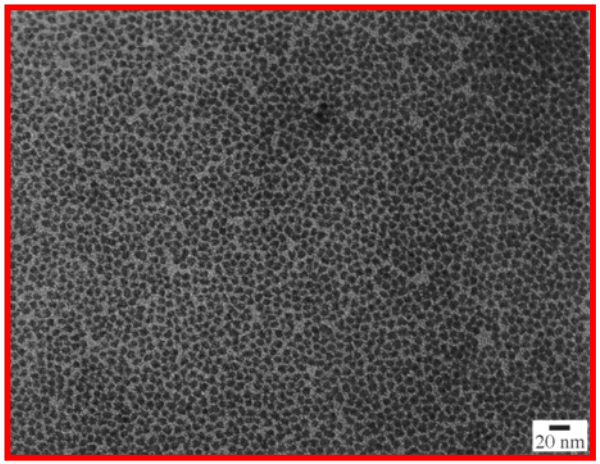



$TiB_2$

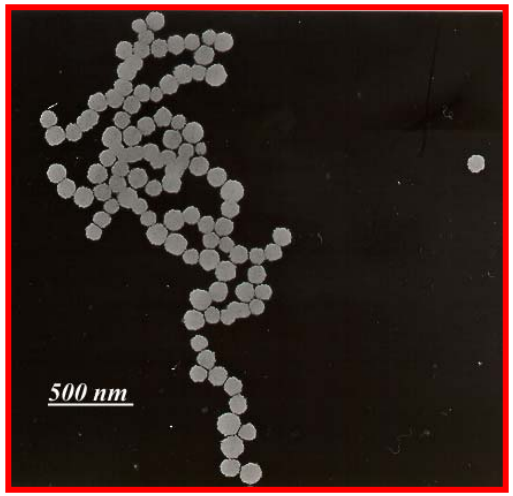



SiC

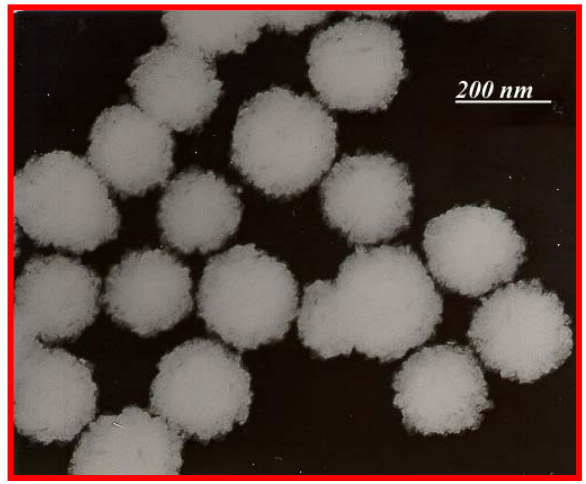
# Nanomat Products



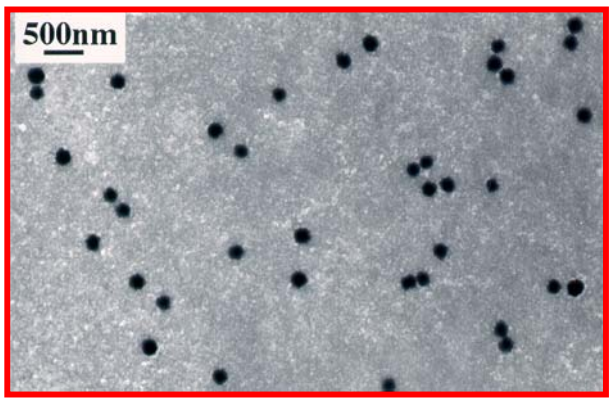

Fe



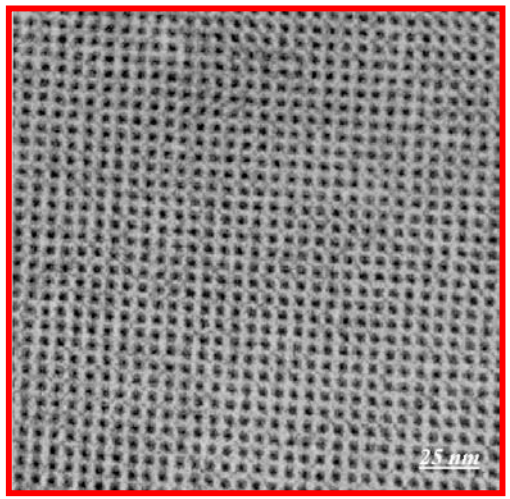

Co



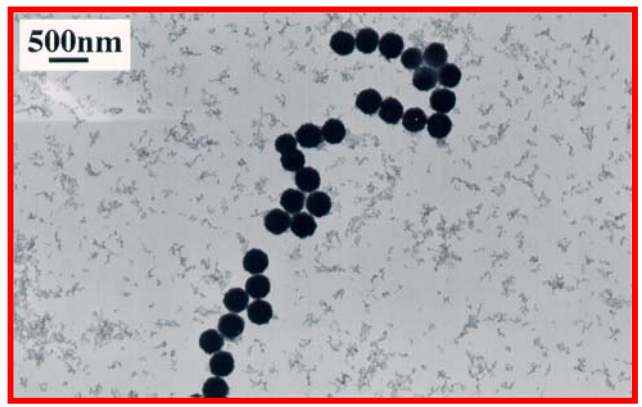

Co




Fe-Co Alloy

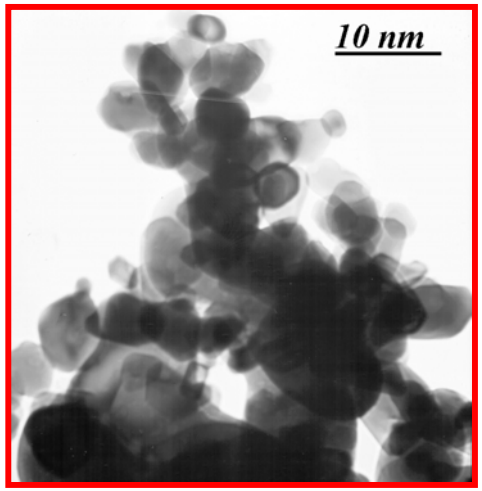



CoPt Alloy



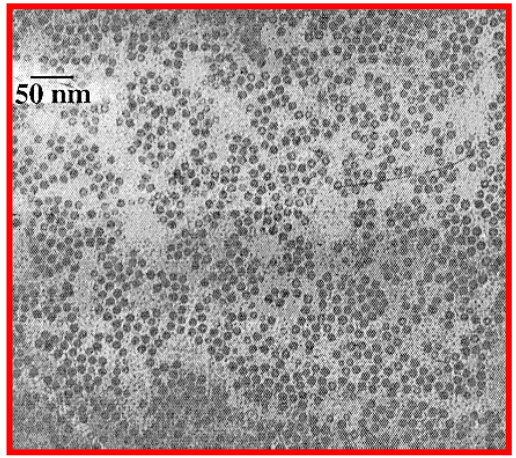

Fe-Co Alloy

# Nanomat Products

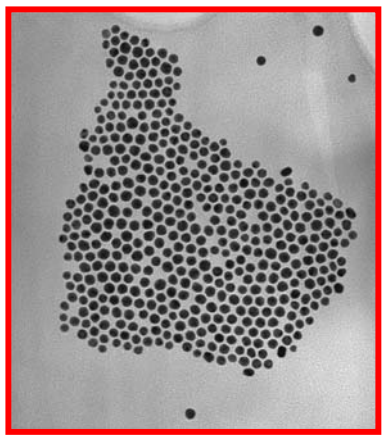



$V_2O_5$

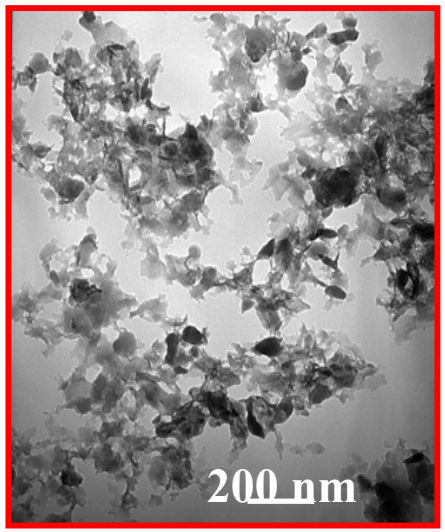

$TiO_2$



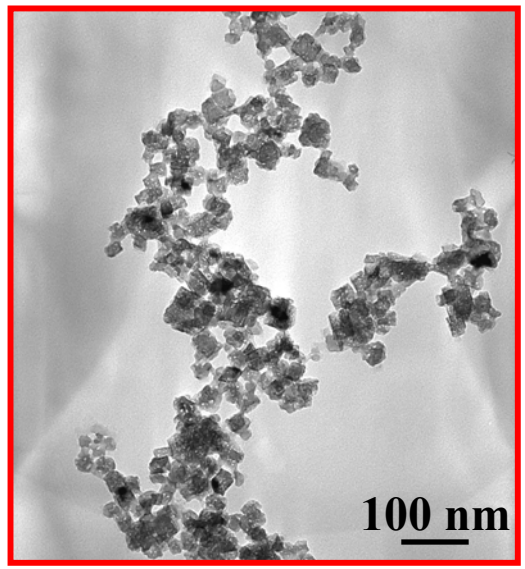

$\gamma$-$Fe_2O_3$



Nano Gold (8-10 nm)

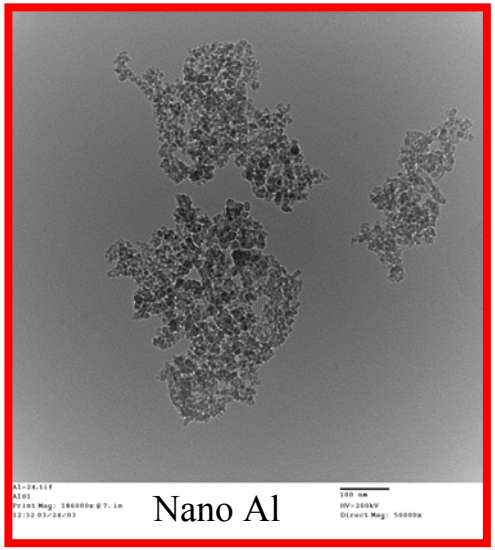


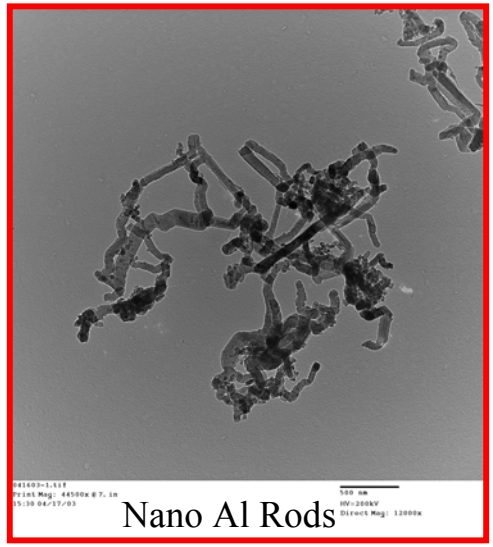

Talc

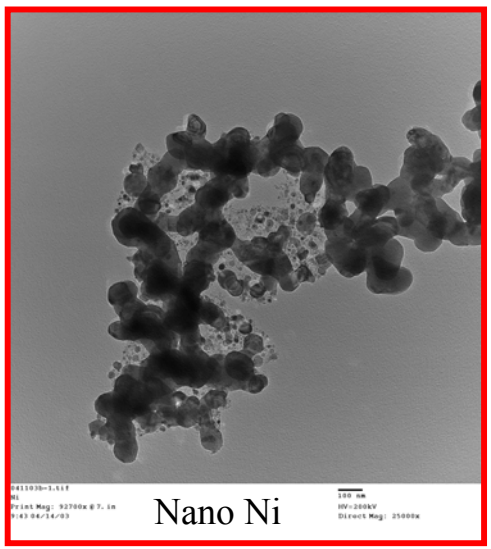


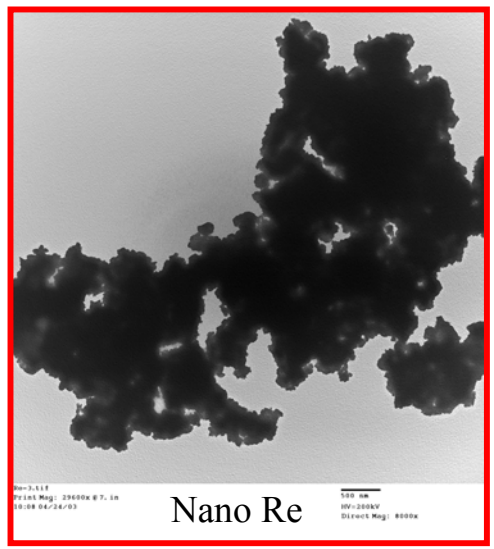

$CaCO_3$

# Nanomat Products

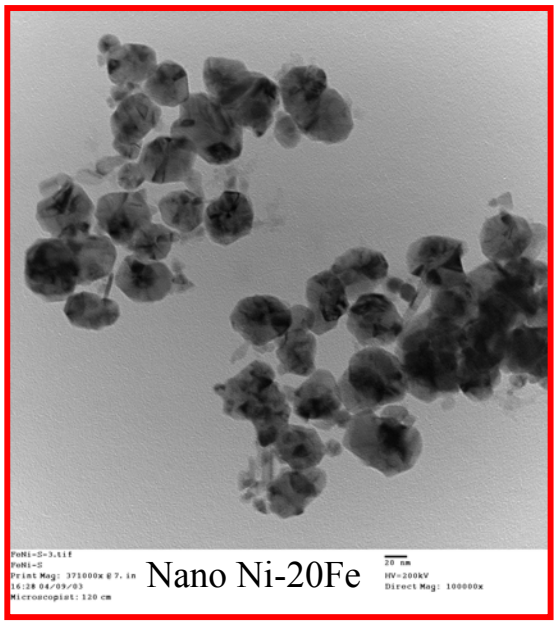

Nano Al

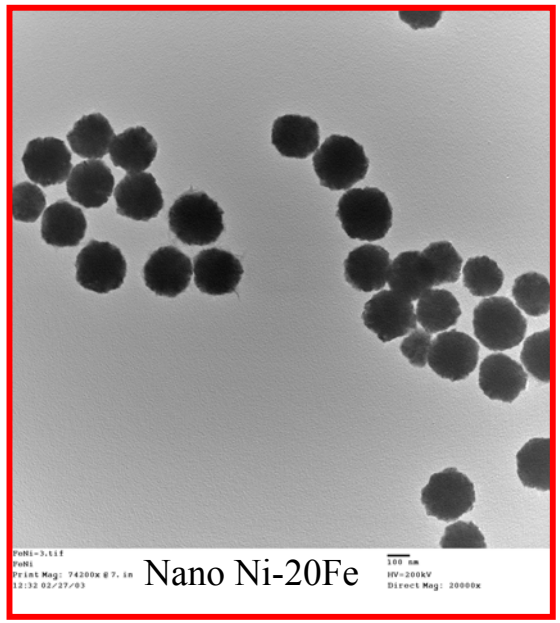

Nano Al Rods

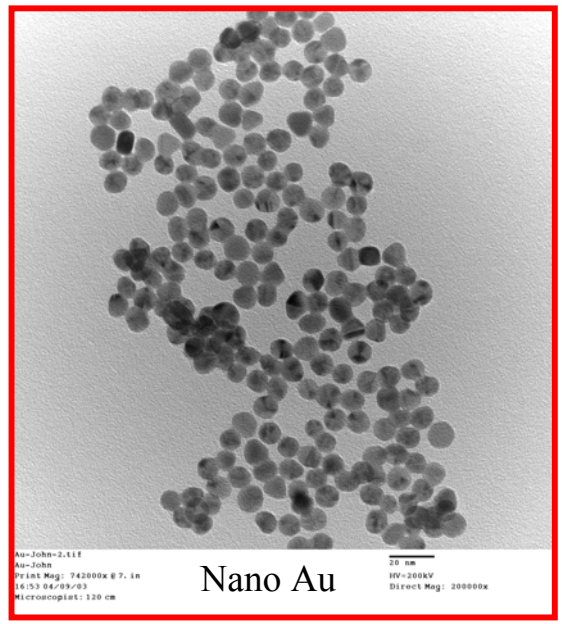

Nano Ni


Nano Re

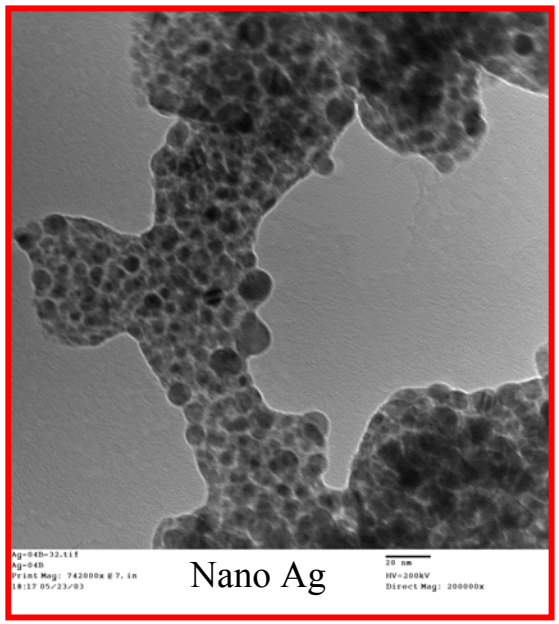
# *Nanomat Products*

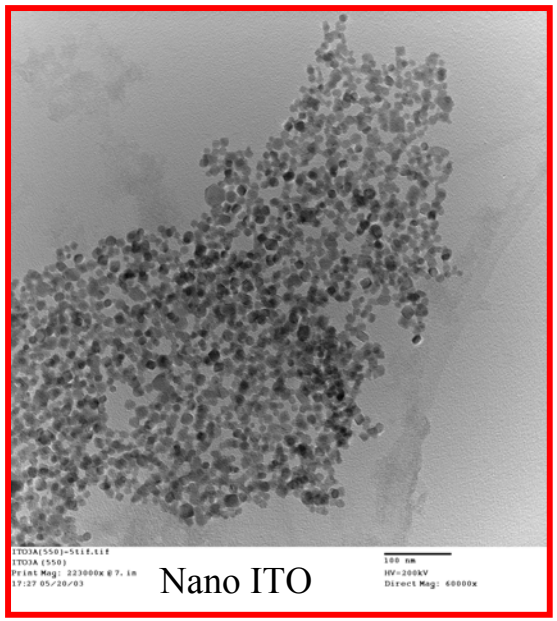

Nano Ni-20Fe

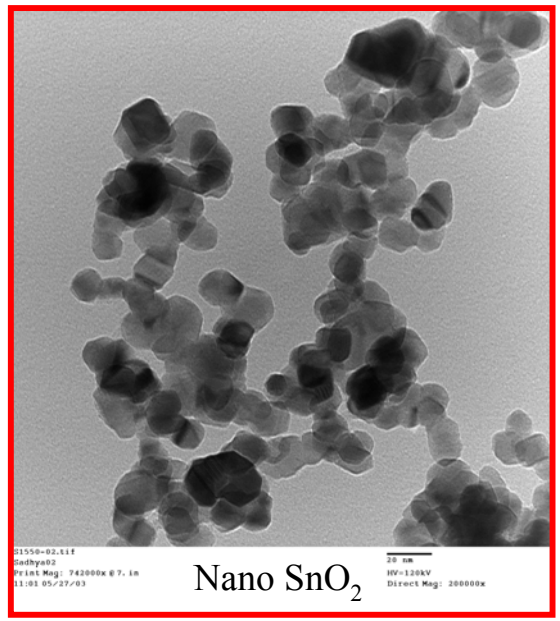

Nano Ni-20Fe


Nano Au

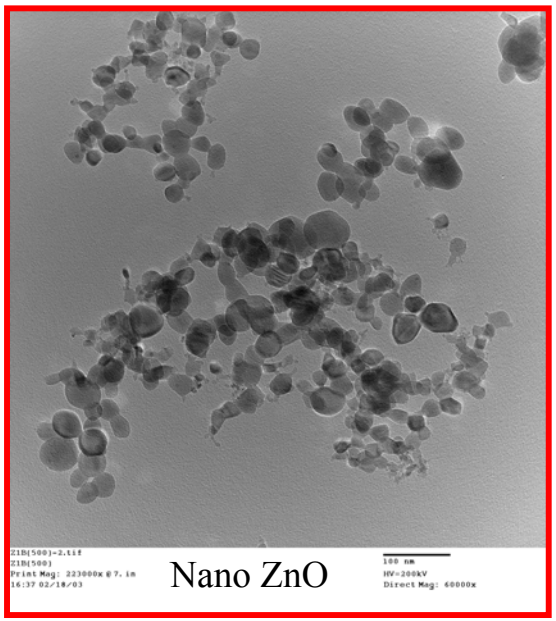
# *Nanomat Products*


Nano Ag

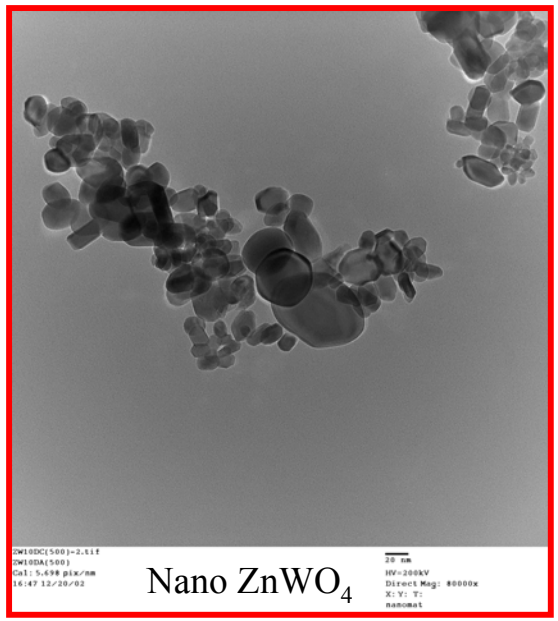

Nano ITO


Nano $SnO_2$

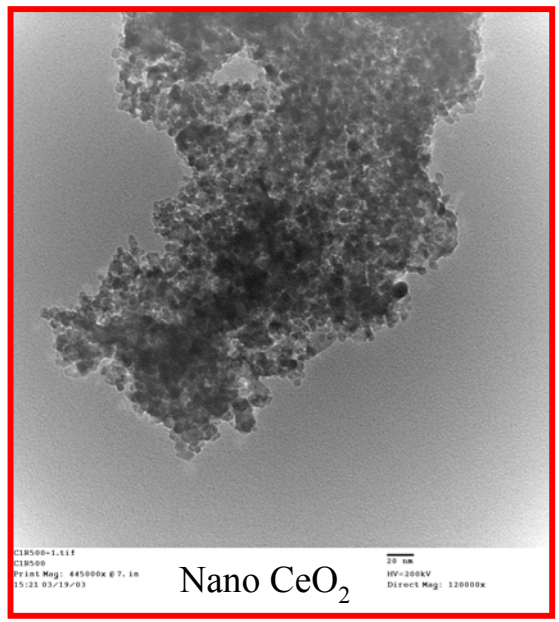
# *Nanomat Products*



Nano ZnO

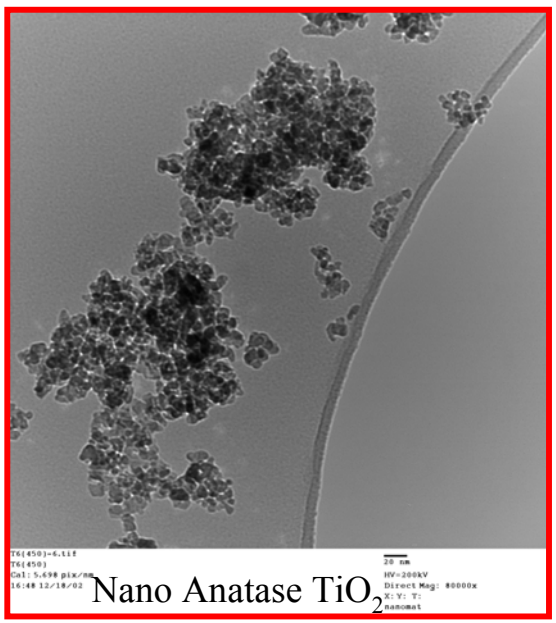


Nano $ZnWO_4$

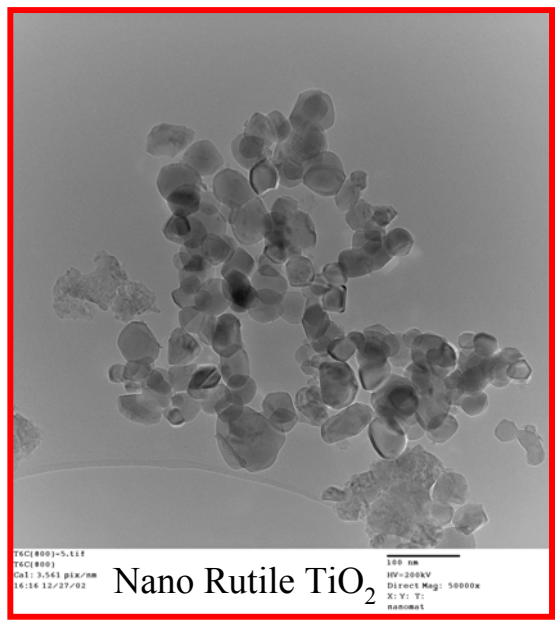


Nano $CeO_2$

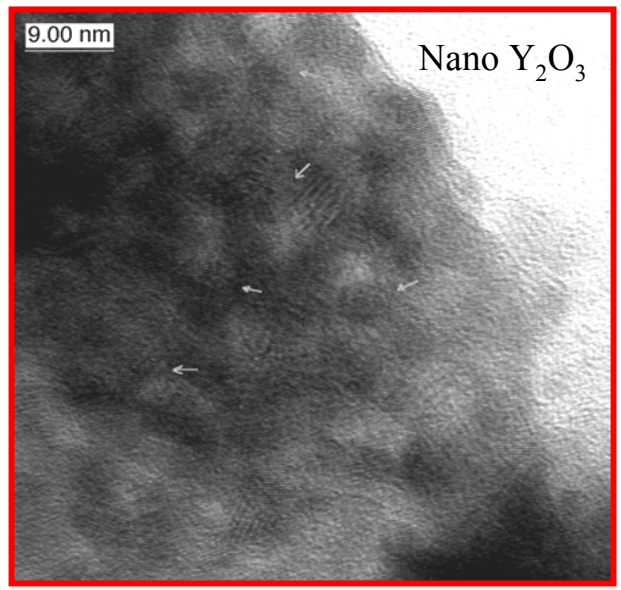
# *Nanomat Products*



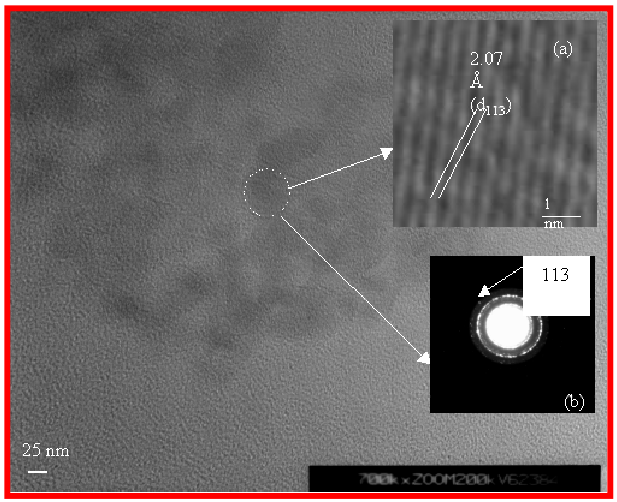
Nano Anatase $TiO_2$



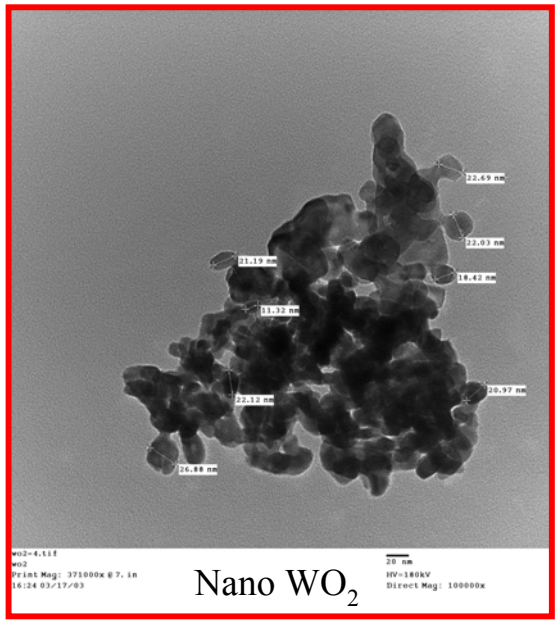
Nano Rutile $TiO_2$



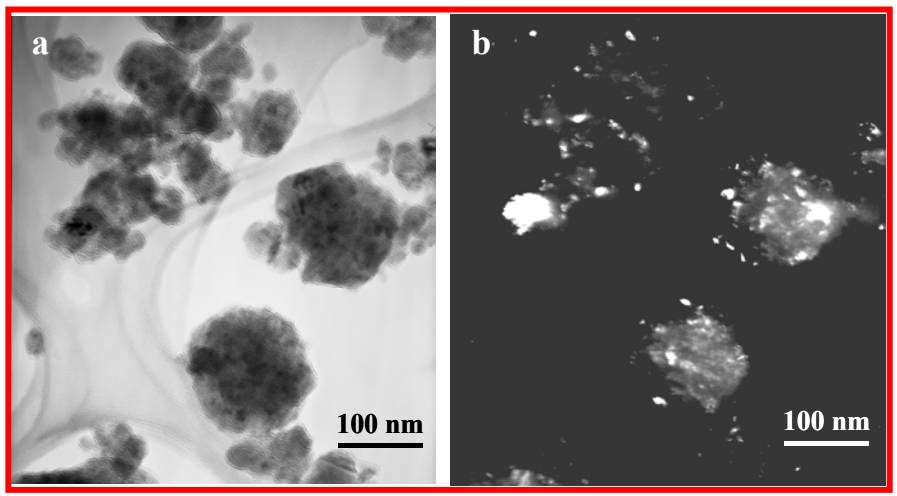
# Nanomat Products



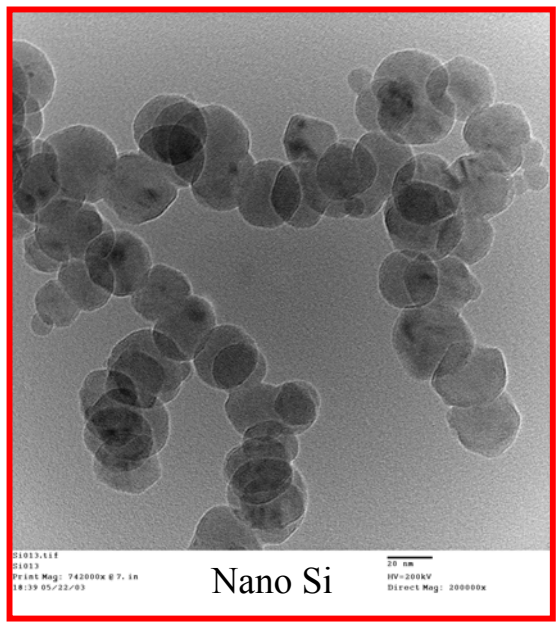

Nano $Al_2O_3$




Nano $WO_2$




AlON

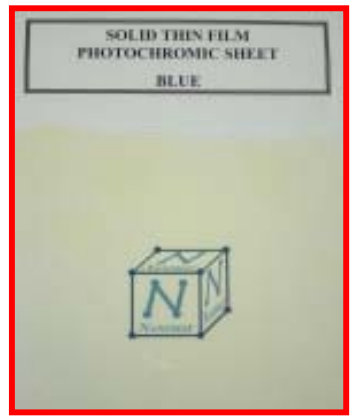


Nano Si

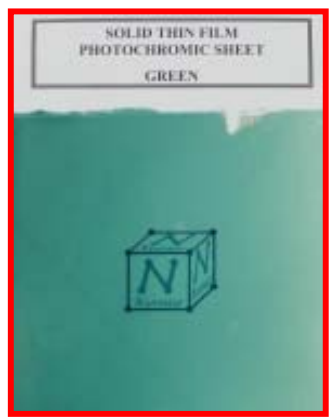
# *Flexible Solid Photochromic Sheets*

Before Exposure to Sunlight



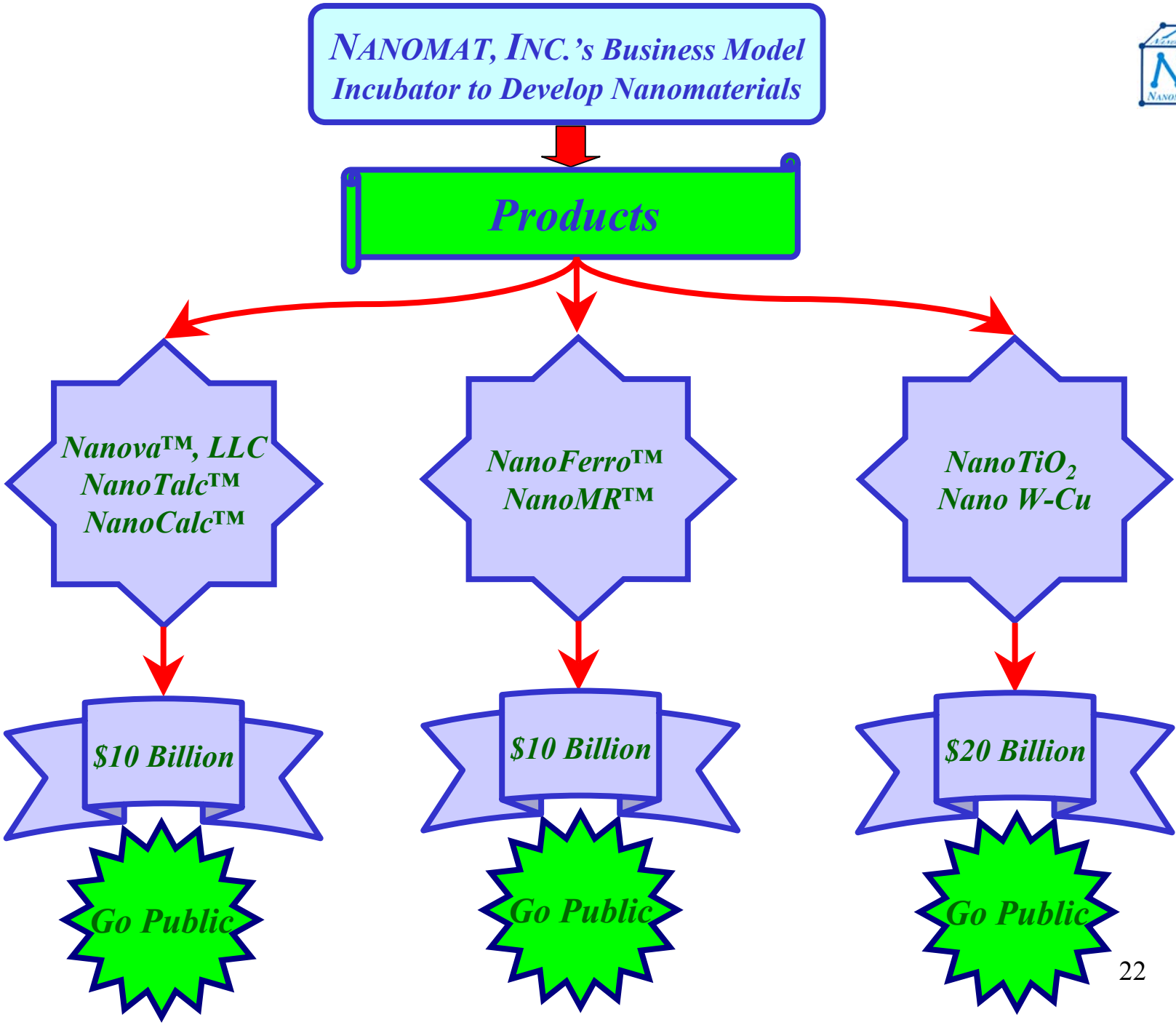



After Exposure to Sunlight


# *NANOMAT, INC. IP Strategy*

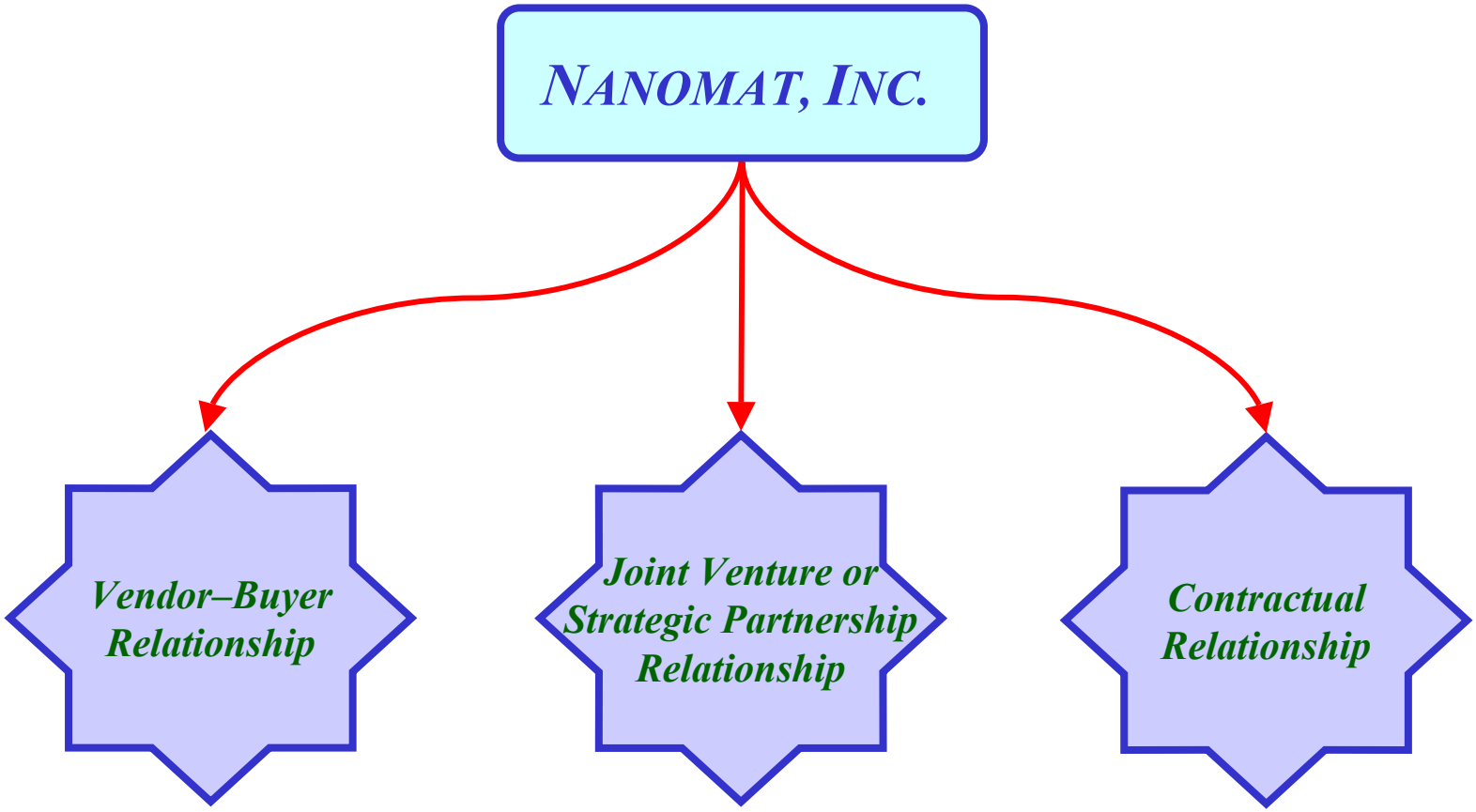
- ***Trade Secrets and Know-how***
- ***U. S. and International Patents***
- ***Provisional Patents***
- ***Trademarks***


NANOMAT, INC.'s Business Model
Incubator to Develop Nanomaterials
Products
Nanova™, LLC
NanoTalc™
NanoCalc™
NanoFerro™
NanoMR™
NanoTiO2
Nano W-Cu
$10 Billion
$10 Billion
$20 Billion
Go Public
Go Public
Go Public

# *Why You?*

- ***Diversity of Products***
- ***Applications Development***
- ***Manufacturing Capabilities***
- ***Sales and Distribution Channels***
- ***Financial Resources***

# *What is in it for you?*




# *Soaring Profits*

# *Summary*

- ***NANOMAT** currently possesses the technologies to deliver nanomaterials to the marketplace.*

- ***NANOMAT** is currently selling numerous nanomaterials for a wide variety of proprietary developmental applications.*

- ***NANOMAT** is currently in discussions with domestic and international investors for spinning off certain technologies into separate companies.*

# *Further Information*

Please contact Srikanth Raghunathan at ***NANOMAT, INC.*** for additional information on nanomaterials, nanotechnologies, and their applications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Fax: ***(724) 861-6119***

e-mail: ***sraghunathan@nanomat.com***