

# Nanomanufacturing

- The utilization of value-added processes to control matter at the nanoscale (1 to 100 nanometers) in one, two, and three dimensions for reproducible, commercial-scale production;
- Encompasses bottom-up directed assembly, top-down high resolution processing, molecular systems engineering, and hierarchical integration with macro-scale systems.

# National Nanomanufacturing Network and InterNano

- Goal: A catalyst for nanomanufacturing R & D advancement in the US via:
  - Cooperative activities (workshops, conference, initiatives)
  - An **information clearinghouse** (InterNano)

*To support, and help launch, communities of practice in nanomanufacturing in both real and cyber space*

**Mark Tuominen - Director of NNN**

**Jeff Morse - Managing Director of NNN**

**Rebecca Reznik-Zellen - Project Manager of InterNano**

**Robert Stevens – Web/Dabase Developer**

Supporting the unique information needs of the nanomanufacturing community.

# InterNano

## Resources for Nanomanufacturing

a project of  National  
Nanomanufacturing  
Network

### Scope

- nanomanufacturing processes
- tools for nanomanufacturing
- nanoscale objects and nanostructured materials
- nanomanufacturing characterization techniques
- environmental, health and safety considerations for nanomanufacturing
- social and economic implications of nanomanufacturing
- informatics and standards for nanomanufacturing
- commercialization, regulation and intellectual property



The screenshot shows the InterNano website interface. At the top, it features the InterNano logo and the text "Resources for Nanomanufacturing". A search bar is located on the right. Below the header is a navigation menu with links for "About", "Events", "News", "Resources", "For Researchers", "For Manufacturers", and "Login". The main content area includes several articles and sections:

- Solid-State Polymer Nanocomposite Electrodes for Flexible, Ultrathin Supercapacitors**: An article discussing emerging trends in energy storage device technologies for thin film materials.
- What is Nanomanufacturing?**: A section explaining that nanomanufacturing is the essential bridge between nanoscience and real-world nanotechnology-enabled products.
- Nanoinformatics**: A banner for an event on November 3-5, 2010, in Arlington, VA.
- Industry News**: A list of news items including "Taking the NanoPulse -- Recession Ends", "Nano-convergence Begins", and "Dancing facets reveal nanowire kinetics".
- Directory**: A section featuring the Accelrys logo.
- Taxonomy**: A diagram showing a hierarchical structure of nanomanufacturing.
- Processes**: A diagram showing a grid of nanomanufacturing processes.

At the bottom of the page, there is a footer with links for "About", "Contact", "Terms of Use", "Feedback", and "Site Map", along with copyright information for the University of Massachusetts Amherst and a note about NSF support.

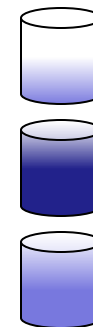
[www.internano.org](http://www.internano.org)

# Information in the Nanomanufacturing Value-chain

*enabling product and manufacturing design*

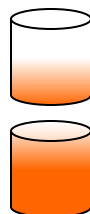
## Data

- Nanomanufacturing process-property relationships
- Nanomaterial properties data - with statistics and metadata
- Experts and facilities
- Suppliers of materials and tools
- Documentary standards
- Best practices



## Tools

- Data mining capabilities
- Lab Automation
- Taxonomy and mapping



## Sharing

- Federated search
- Attribution
- CC licensing
- Open resources



# Presently Available Resources

*a starting point for nanomanufacturing information*

Nanomanufacturing Process Database

## 13. Phosphine-Stabilized Gold Nanoparticles



Phosphine-stabilized gold nanoparticles have a rich chemistry and are excellent building blocks for functional groups, however they have typically been synthesized through cumbersome and unsafe methods. This process is a safer, more convenient, and more versatile procedure to synthesize small, phosphine-stabilized gold nanoparticles under ambient conditions.

PENDING APPROVAL

**Contributors:** Weare WW, Reed SM, Warner MG, Hutchinson JE  
**Lab:** Department of Chemistry and Materials Science Institute, University of Oregon

**Manufactured Nanomaterial or Structure:** Phosphine-Stabilized Gold Nanoparticles

**Chemical composition:** Au101(PPh3)21Cl5

**Physical Form:** solid, powder

### Properties:

#### CHEMICAL

- purity: 75.8%

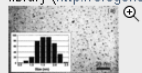
#### OPTICAL

- surface plasmon resonance: 520 nm


#### PHYSICAL

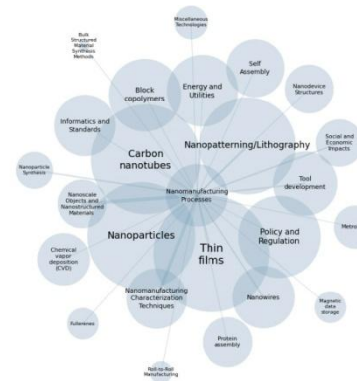
- diameter: 1.5 nm

**Environmental, Health & Safety Considerations:** Pleaes refer to the NBI Knowledgebase nanomaterial library (<http://oregonstate.edu/nbi/nanomaterial.php>)



### Process:

1. Dissolve hydrogen tetrachloroaurate trihydrate (1.00 g, 2.554 mmol) and tetraoctylammonium bromide (1.60 g, 2.93 mmol) in nitrogen sparged water/toluene mixture (50 mL/65 mL).
2. After golden color transfers to organic phase, add triphenylphosphine (2.32 g, 8.65 mmol) to the solution and stir vigorously for 10 min until phase is white and cloudy.
3.  Add aqueous sodium borohydride (1.41 g, 37.3 mmol, dissolved in 10 mL of water immediately prior to use) to solution. Organic phase will immediately turn dark purple.
4. Stir for 3 hours under nitrogen.



## Taxonomy

Click on the @ to expand each category. Click on the category name to view related content.

### Taxonomy

#### My Tags

#### Areas of Application

- Aerospace and Automotive Industries (5)
- Electronics and Semiconductor Industries (18)
- Energy and Utilities (8)
- Environment and Civil Infrastructure (1)
- Food Industries
- Forest and Paper Products (1)
- Materials and Chemical Industries and Green Manufacturing (20)
- Medical and Pharmaceutical Industries (25)
- Nanotextiles and Personal Care (4)
- National Security and Defense (2)
- Environment, Health, and Safety (8)
- Informatics and Standards (24)
- Nanomanufacturing Characterization Techniques (29)
- Nanomanufacturing Processes (30)
- Nanoscale Objects and Nanostructured Materials (20)
- Social and Economic Impacts (17)
- Tool development (27)

## Taxonomy



Elmarco, Inc. and Elmarco s r o

<http://www.elmarco.com>  
Fred Lybrand, VP, N. America  
(919) 334.6495  
fred.lybrand@elmarco.com

### Mailing Address @

Elmarco is the industry's first supplier of industrial scale nanofiber production equipment. Our partnerships with global industrial leaders and universities form the foundation for our success. Elmarco's Nanospider™ technology allows nanofibers to be produced on an industrial scale for a number of applications. Supported by a broad patent suite, Nanospider™ is a high voltage electro-spinning process that does not use needles.

**Tags:** Nanofibers, Electrospinning, Nanoparticles, Nanoparticulate, Nanospheres

**Visualize:** Graph

## Directory