

Source of Environmental and Health Concerns in the Fabrication of Nanomaterials

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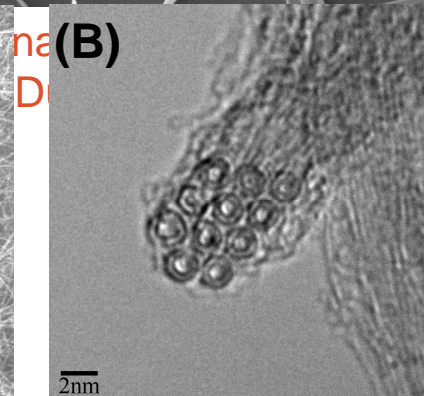
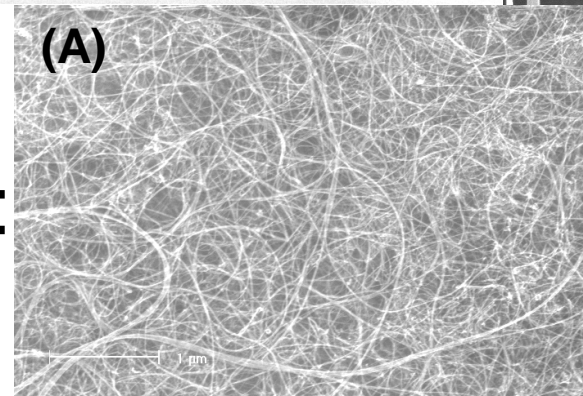
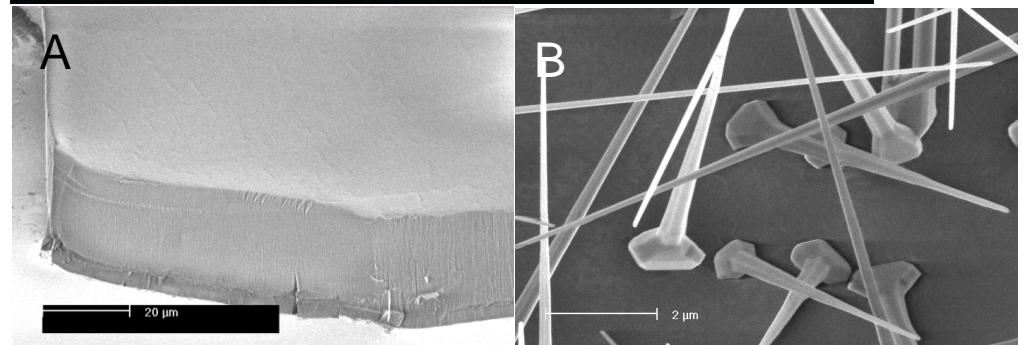
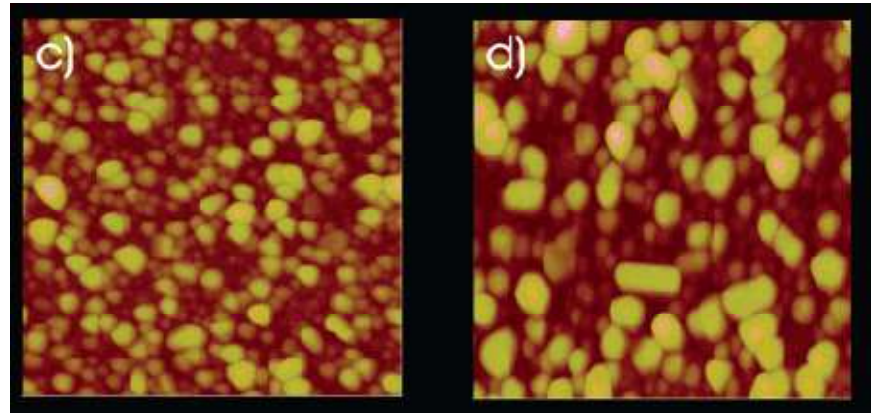
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Types of Nanomaterials

- Nanoparticles:
 - Metal
 - Metal oxides
 - QDs
- Nanowires:
 - Si
 - Metal oxides
- Carbon Nanotubes:



Possible Origins of Environmental Concerns

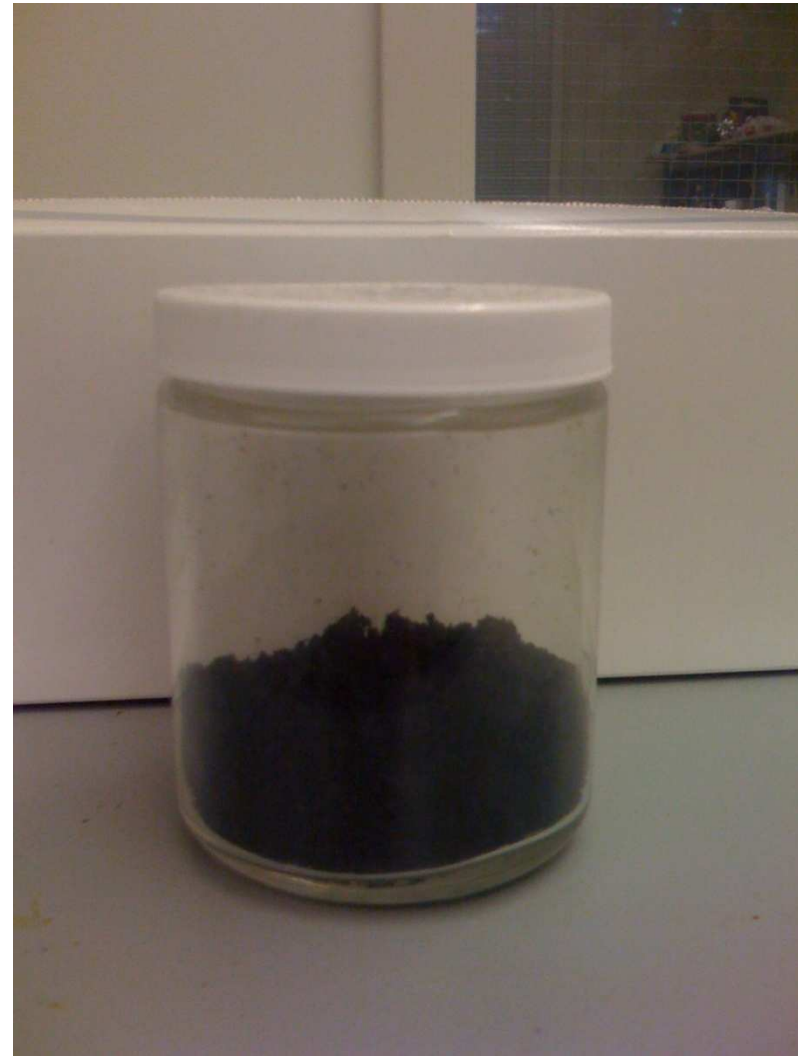
- Nanomaterials themselves;
- Intermediates in the production of nanomaterials;
- Commercial products containing nanomaterials;
- Wastes from productions;
- Etc.

Example: Carbon Nanotube Production



Major Concerns I

- Raw CNT Materials:
 - Easily airborne;
 - Very light weight;
 - Unknown health effects;



Major Concern II

- Catalysts:
 - Light weight;
 - Easily airborne;
 - Small powder particles;



Major Concern III

- Flammable Gases:
 - CH₄
 - CO
 - H₂
 - C₂H₆
 - Etc.



Major Concern IV

- Waste:
 - Acids: HNO_3 , HCl ,
 - Oxidizers: H_2O_2
 - Short CNTs
 - Carbon nanoparticles



Precautions in Research Labs

- Gas detectors all over the lab;
- Lab coat required;
- Glove required;
- Mask required when handling Catalyst and Raw CNT powder;
- Regular powder concentration analysis in Lab by University safety Office;
- Follow all regulations required to handle acidic waste;



Conclusions

- Environmental and Health concerns from the production of nanomaterials not only from the materials themselves but also might involve the intermediates and the wastes;
- For different materials, the origin of such concerns are different and need to be analyzed carefully;
- The community need to be aware of potential concerns and develop protocols to protect researchers and workers from these dangers.