



ESCOLA POLITÉCNICA DA UNIVERSIDADE DE SÃO PAULO

- PQI 3203 Fenômenos de Transporte I

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ESCOLA POLITÉCNICA DA UNIVERSIDADE DE SÃO PAULO

Aula 15 – Evolução da ciência das partículas

PQI 3203 Fenômenos de Transporte

1 Planejamento

1. Evolução

1. Nano partículas
2. Células biológicas

2. Conclusão

Evolução

- Particle Science and tecnology
- <http://perc.ufl.edu/>
- Nanopartículas
- Células biológicas

Faixas

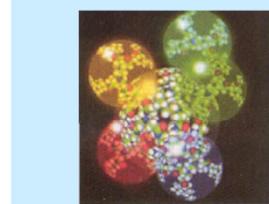
| | | Particle diameter, μ | | | | | | | | | | | |
|--|--|--------------------------|--------------------|------|--------|--------|--------|---------|-------------------------|---------------------------|-----------|-----------|--|
| | | 0.0001 | (μ) 0.001 | 0.01 | 0.1 | 1 | 10 | 100 | (mm) 1000 | (cm) 10,000 | | | |
| Equivalent sizes | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | |
| Electromagnetic waves | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Tyler screen mesh |
| Technical definitions | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Theoretical mesh (used very infrequently) |
| Gas dispersoids | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Solid: |
| Liquid | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Fume |
| Soil | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Mist |
| Common atmospheric dispersoids | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Visible |
| Electromagnetic waves | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Near infrared |
| Technical definitions | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Far infrared |
| Common atmospheric dispersoids | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Visible |
| Typical particles and gas dispersoids | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Visible |
| Methods for particle-size analysis | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Visible |
| Types of gas-cleaning equipment | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Visible |
| Terminal gravitational settling% (for spheres, specific gravity 2.0) | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Visible |
| Particle-diffusion coefficient, $\text{cm}^2/\text{sec.}$ | | 10 | 100 | 1000 | 10,000 | 25,000 | 62,500 | 150,000 | 312,500 | 781,250 | 1,953,125 | 4,882,812 | Visible |

Nanopartículas

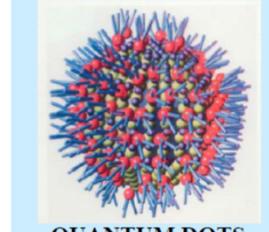
- Slide 54 – R. Davies
- PARTICLE ENGINEERING
RESEARCH CENTER AT
THE UNIVERSITY OF FLORIDA



CARBON NANOTUBES
R&D MAGAZINE JUNE 1999

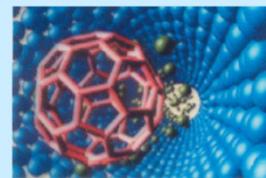


"TECTODENDRIMERS"
CHEM.ENG.PROG. NOV. 2003

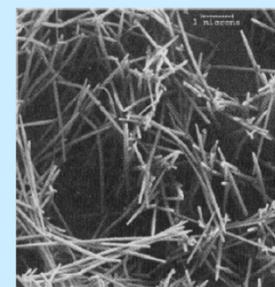


QUANTUM DOTS

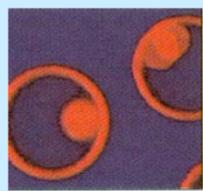
NANO-DEVELOPMENTS



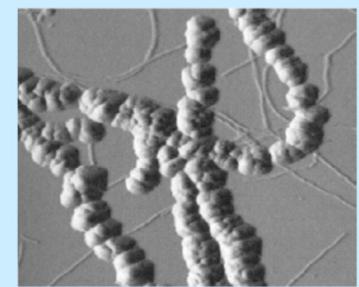
BUCKY BALLS
OAK RIDGE NATIONAL
LABORATORY REVIEW



"NANOWIRES"
TECHNOLOGY REVIEW
OCTOBER 2003



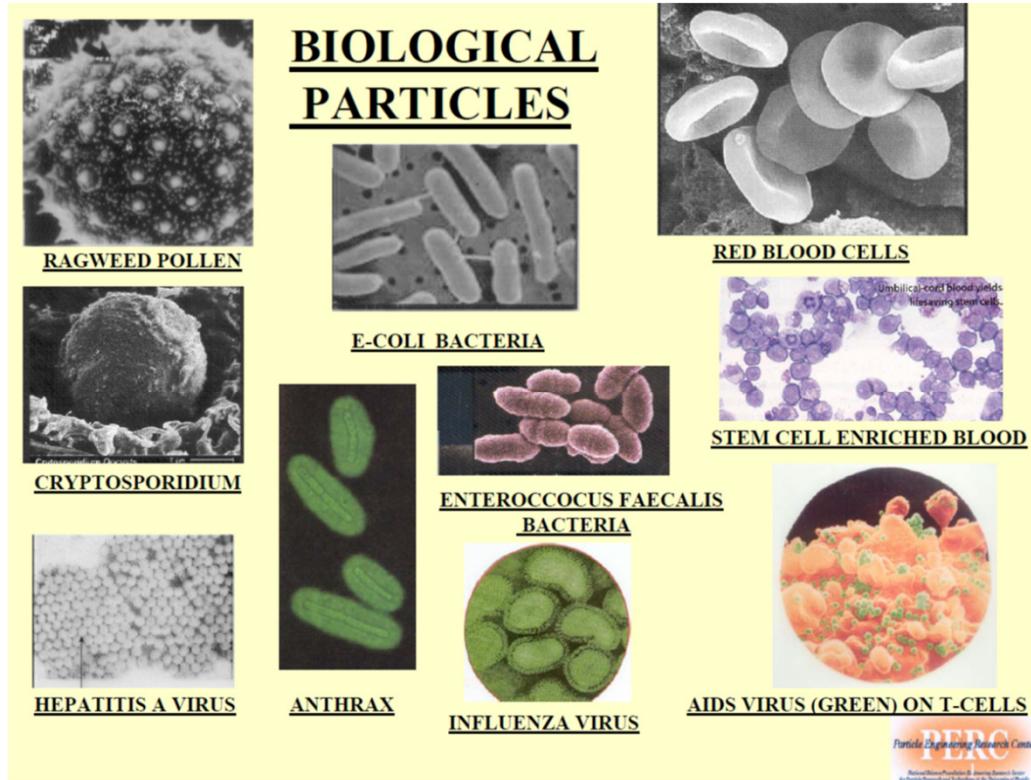
NANOPARTICLE DRUG
DELIVERY CAPSULES"
CHEM.ENGG.PROG. NOV 2003



PROTEIN-BASED, GOLD & SILVER
NANOWIRES
TECHNOLOGY REVIEW JUNE 2003

Células biológicas

Slide 55



Partículas

- The first is the interfacial properties of particulate systems.
- The second quality is that materials in particulate form (e.g. powders, slurries, droplets, emulsions) can often be handled, transported and processed with greater ease and economy than the same materials in bulk forms.
- The third quality arises, as particles get so small that their size approaches molecular dimensions.

6 Conclusões



Balanço de forças – F_R : sedimentação, fluidização e elutriação



Do laminar ao turbulento



Diversas correlações



Resultados diferentes – relações empíricas

Bibliografia

- <http://perc.ufl.edu/>