

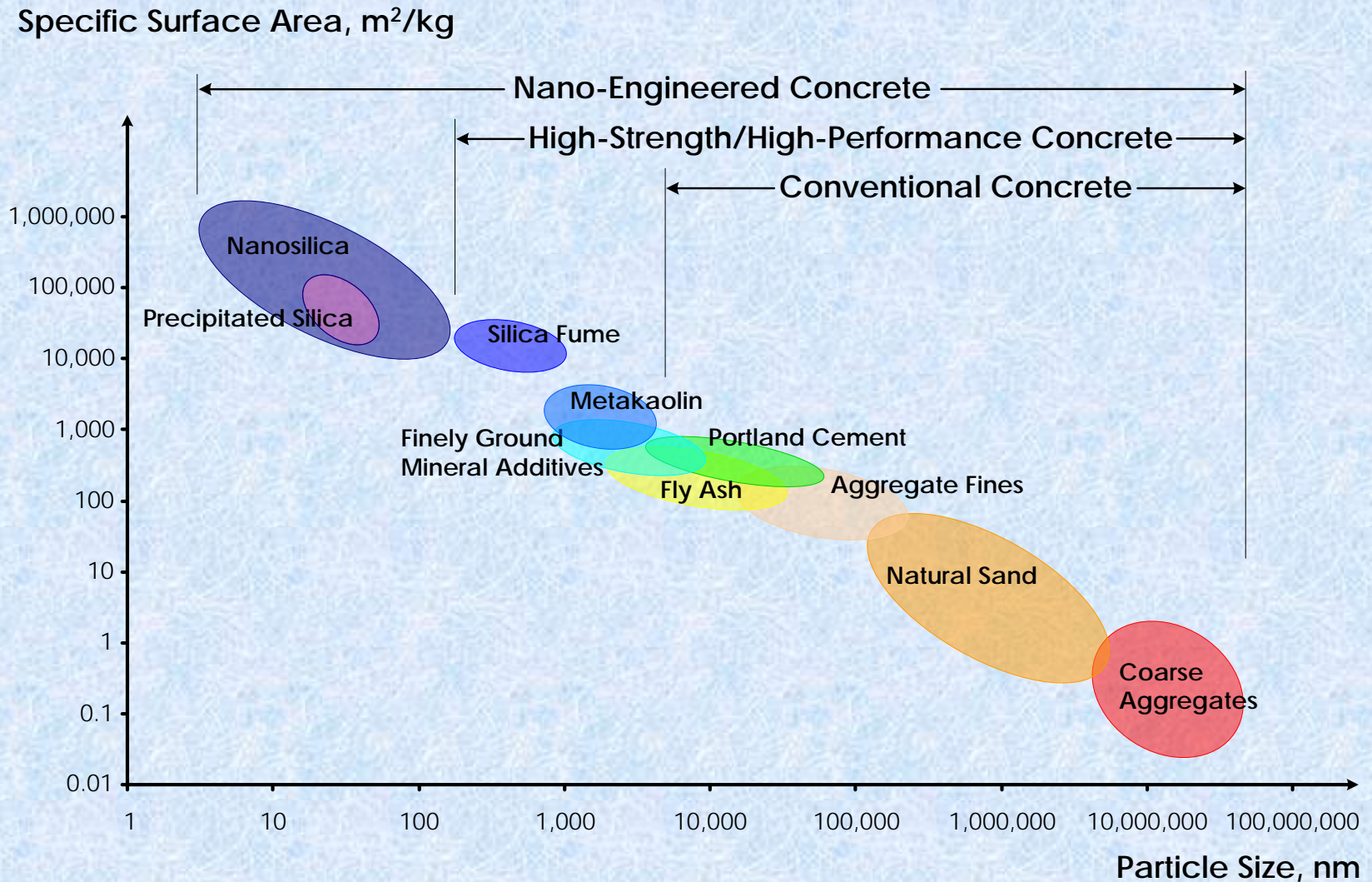
Nanotechnology and Concrete

Future of Materials

What is Nanoscale?

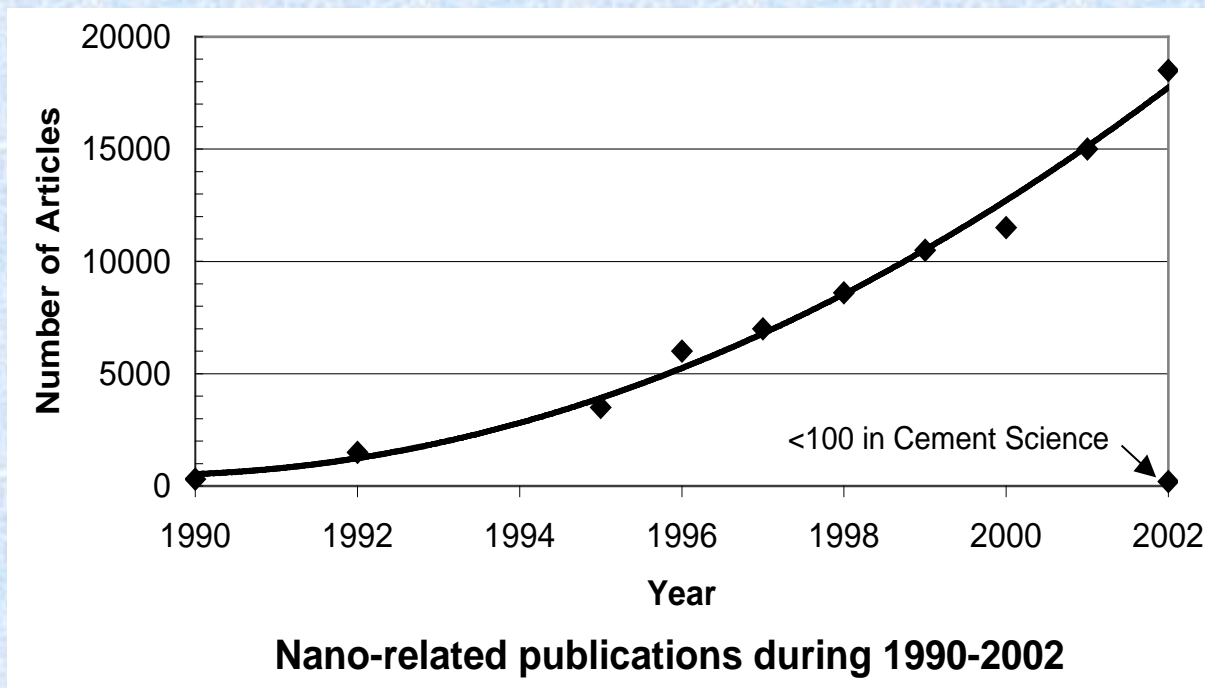
- Nano – one billionth of a unit of measure
- A strand of DNA is 2 nm wide
- A human hair is about 100,000 nm
- When matter is controlled at the nanoscale, the following fundamental properties can change completely:
 - temperature
 - electricity
 - magnetism
 - chemical reactions

PARTICLE SIZE SCALE RELATED TO CONCRETE



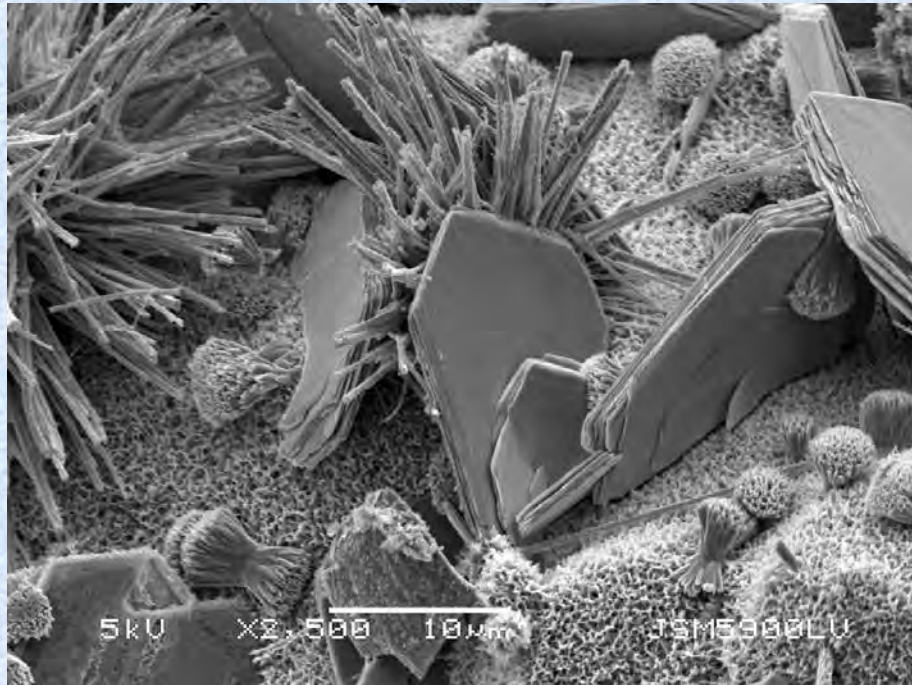
Nanotechnology in Cement Science

Understanding and manipulation of materials on the nanoscale from 0.1 nm to 100 nm.

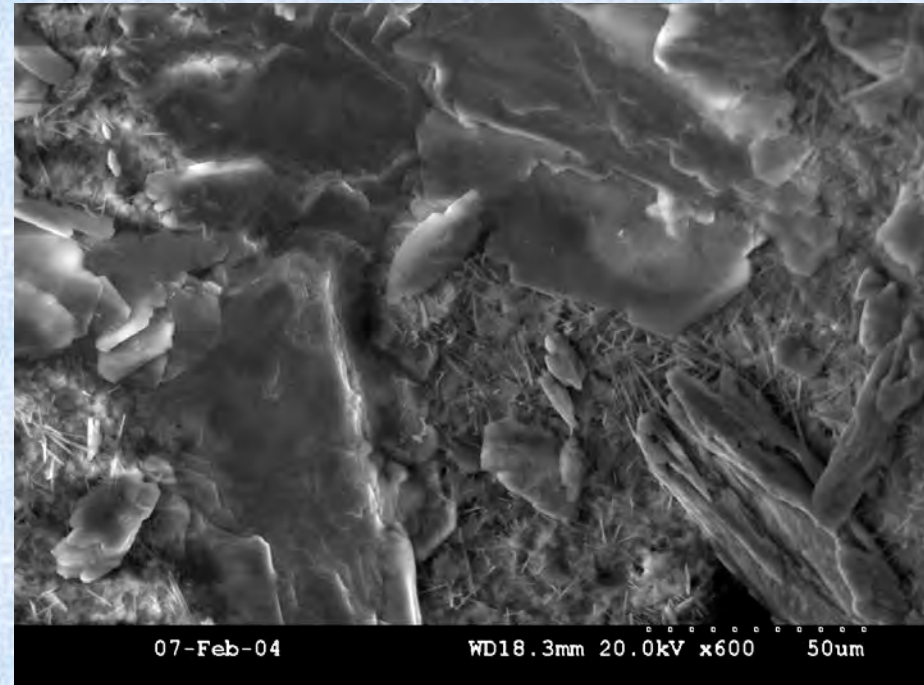


Nanopictures

Unmodified Cement Paste Microstructure



Modified Microstructure - Cement Paste with Clay/Polymer (1:1)



ROADMAP FOR NANO

- High performance
 - Strength, ductility, permeability, shrinkage
- Sustainable
 - Color, ASR, improve recyclability
- Intelligent
 - Nano-sensors to monitor the concrete
- Novel
 - Specialty products, SCC for slip-forming
- Nano-scale model of chemical interaction and concrete

DOTs and Nanotechnology

- 2006 NSF Int Conf in Florida
- TRB TF AFN15T established under Emerging Concrete Technologies Committee
 - Florida, Georgia, New Mexico, New York, Rhode Island
- TRB Sessions – 2008 Workshop and poster session, 2009 Paper session



TRANSPORTATION RESEARCH BOARD

OF THE NATIONAL ACADEMIES

First International Conference on Nanotechnology in Cement and Concrete May 5-7, 2010 Beckman Center, Irvine, California



Nano and You

- Attend and encourage your States university researchers to attend the Spring 2010 conference
- Keep an open mind

Think
NANO⁻¹!!

