Nanomaterials

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Lec. 18

2018-2019

Applications of nanomaterials

Nanocoatings

_ Coatings are thin coverings that are deposited on a base material to enhance its surface characteristics or appearance.

_ This broad definition includes coatings used to improve durability or wearing characteristics, provide corrosion resistance, or otherwise protect the base material.

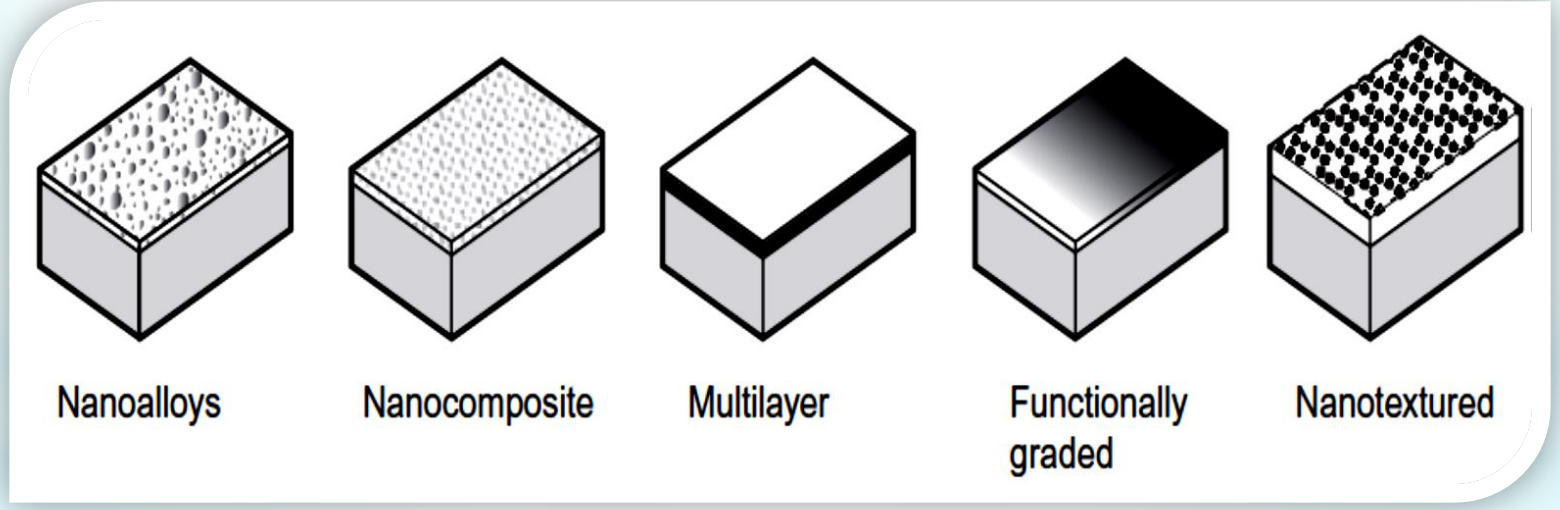
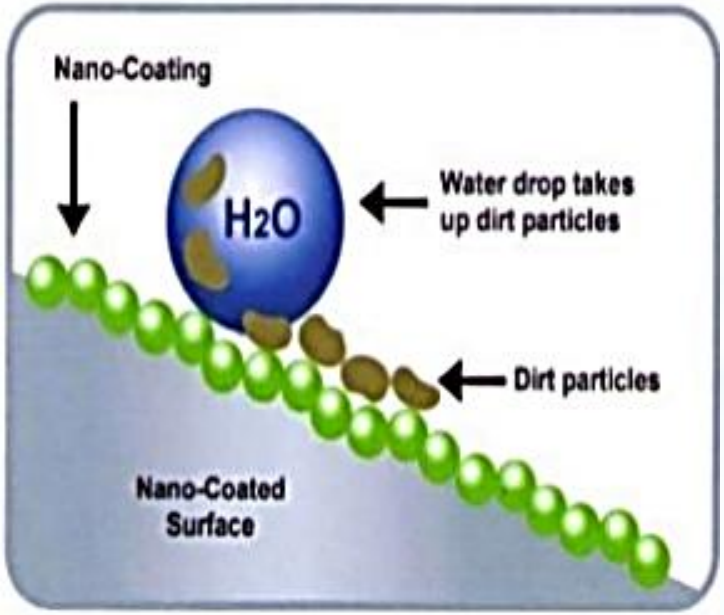


Fig. (1)Types of nanocoatings

Surface and Coatings

The most promined application of nanotechnology in the household is self-cleaning or “easy-to-clean” surfaces on ceramics or glasses.

Nano ceramic particles have improved the smoothness and heat resistance of common household equipment such as the flat iron.



Nano-concrete

_ Concrete is fundamentally composed of a mixture of coarse and fine aggregates, cement, and water.

_ Synthetic cements are usually made by grinding calcinated limestone and clay into a fine powder. On mixing with water, an exothermal reaction occurs with the cement that causes time-dependent hardening.

_ The obvious routes for using nanomaterials to improve concrete are generally either in process considerations (ease of mixing, rate of setting, etc.) or in property enhancements.

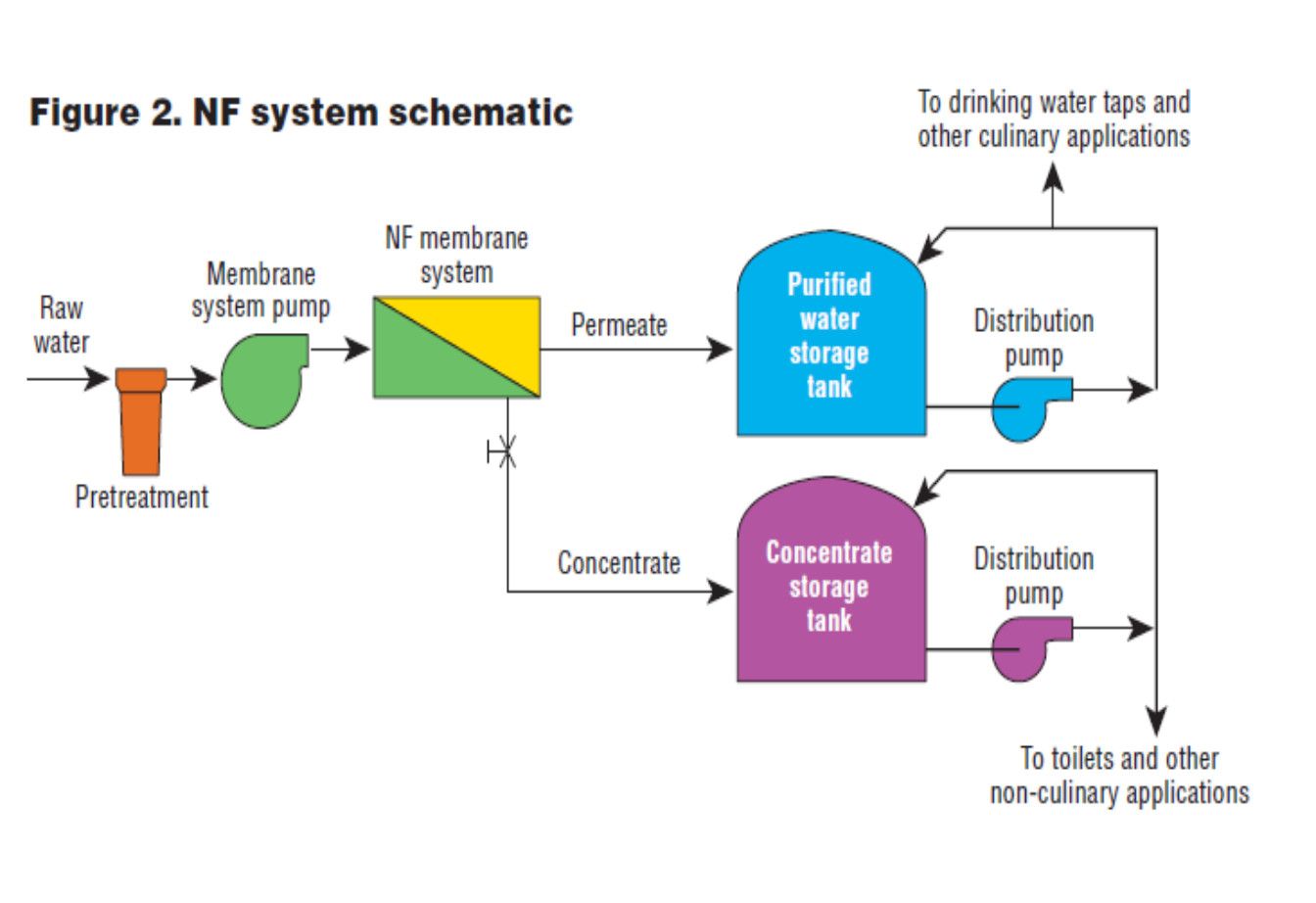
Benefits of nanoparticles for concrete

- Well dispersed nanoparticles increase the viscosity of the liquid phase, improves the segregation resistance and workability of the system.
- Accelerates the hydration.
- Better bond between aggregates and cement paste.
- Improves the toughness, shear, tensile strength and flexural strength of concrete.
- The addition of small amount (1%) of CNT improves the mechanical property of concrete.

nanofiltration

A **nanofiltration** filter has a pore size around 0.001 micron. Nanofiltration removes most organic molecules, nearly all viruses, most of the natural organic matter and a range of salts. Nanofiltration removes divalent ions, which make water hard, so nanofiltration is often used to soften hard water.

Nanofiltration System



Benefits of nanofiltration

- Low cost of operation.
- Low energy cost.
- Reduction of water hardness.
- Reduction/ Removal of viruses, bacteria and pesticides.