Waves of Innovation

Source: Natural Edge

Adapted from L Hunter Lovins 2008
Nature’s strongest

Mother-of-pearl's exceptional strength derives from its "bricks and mortar" structure. Materials scientists want to mimic this with clay and polymers.
Biomimetic system
Bentonite assembly with PVOH and crosslinking

**SCHEME 1.** Strategy toward the Preparation of Biomimetic Self-Assembled Brick and Mortar Structures Based on Common, Scalable, and Simple Processing Methods

First, nanoclay particles are coated with an individual layer of polymer via adsorption and separation. This yields a route towards optimal colloidal building blocks by tuning the soft polymer layer on the hard inorganic core, as well as quantitative exfoliation. The polymer-coated nanoclay particles (center) are then ordered into nacre-mimicking layered composites via three techniques, paper-making, doctor-blading, or painting.

Platelet alignment through Blade applicator

Source: Walther et al 2010
Shape Effects: Strength of Coatings

Blends of ultrafine GCC with Kaolin UFP, 5 pph latex

Kaolins coatings are weaker in the z-direction than xy due to particle alignment, GCC’s have the same strength properties in both directions (round particles). Differences in Z-directional strength with increasing kaolin are small compared to the increase in tensile strength (Stiffness)

Source Husband 2008