

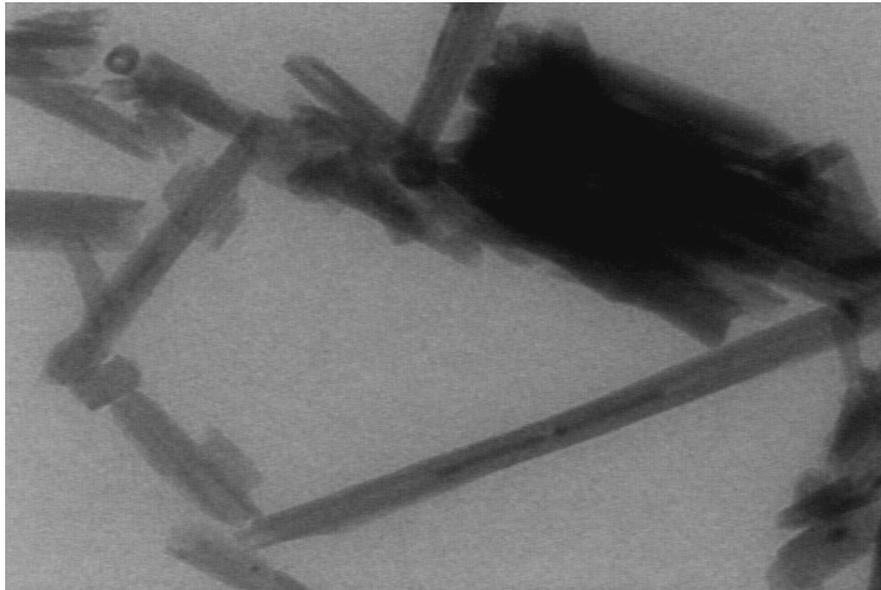
NaturalNano Extended Release Technology

NaturalNano Inc. is offering a unique technology for extending the release of active ingredients in the cosmetic field. This technology was developed and patented at the Naval Research Laboratory and NaturalNano Inc. holds an exclusive license for these patents.

The technology is based on the filling and encapsulating of Halloysite Natural Tubules (HNT)[™].

How the Technology Works:

The HNT is “loaded” with active species. There are four volumes to load: the lumen, the outer wall surface, the interior wall surface, and the intercalating water layer. The lumen has the largest volume and the most chemical flexibility due to its size and charge. The measure pore volume of HNT is from 0.17cc/g to 0.19cc/g. Typical loading is 20% active by weight. The final product can then either be provided as a dry powder or dispersed in an aqueous, polar, or non-polar system. If required the loaded tubes may be encapsulated via a polymer that slows the release.



Transmission Electron Image of loaded HNT[™]

Why tubes?

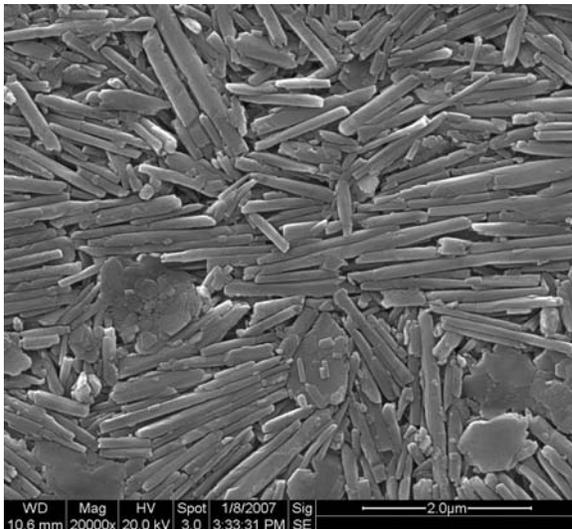
Diffusion from a tube is much different than diffusion from a sphere due to the relationship between volume and surface area. Tube diffusion is much closer to zero order release, i.e. continuous even release over time.

About Halloysite Natural Tubules (HNT™)

Naturally formed in the Earth over millions of years, halloysite natural tubules are unique and versatile materials that are formed by surface weathering of aluminosilicate minerals and comprise aluminum, silicon, hydrogen and oxygen. Halloysite is a member of the Kaolin group of clays.

Halloysite natural tubules are ultra-tiny hollow tubes with diameters typically smaller than one tenth of a micron (100 billionths of a meter), with lengths typically ranging from about half of a micron to over 5 microns (millionths of a meter). The hollow opening (lumen) of the HNT is approximately 20 nanometers. Release of active ingredients can be controlled through selection of tube diameter and length as well as the type of encapsulation technology employed.

Several commercial deposits of HNT exist throughout the world but often these deposits contain impurities. NaturalNano has developed processes for extracting, separating, and classifying halloysite natural tubules from several deposits and can deliver hundreds of tons per year.



Secondary Electron Image of HNT™
Courtesy of Alfred University

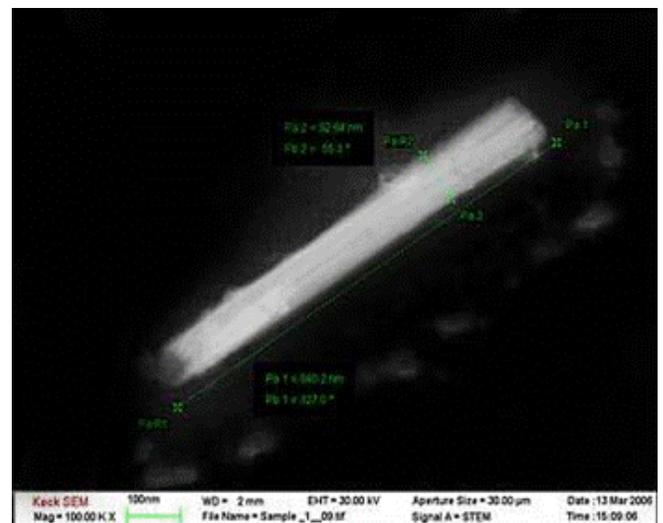


Image courtesy of Cornell University