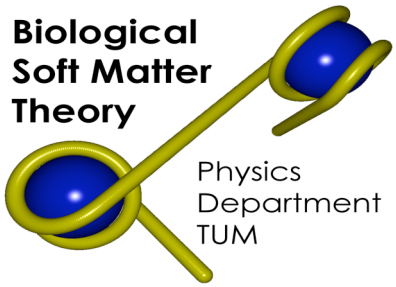


# "Soft-Matter Seminar"

## Evaporation Induced Self-Assembly of Functional and Living Nanostructures

C. Jeffrey Brinker

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Abstract:

Over billions of years, biological systems have evolved to solve difficult engineering problems like water collection and purification, self-cleaning and repair, environmental sensing, energy transduction, actuation, and adaptation. From a materials science perspective, nature's solutions often involve disparate materials (hard/soft or hydrophilic/hydrophobic) combined in 3D hierarchical architectures resulting in synergistic, optimized properties and combinations of properties. Emulating such proven natural designs in robust engineering materials using efficient, manufacturable processing approaches represents a fundamental current challenge in materials sscience and engineering. Over the past decade our group has developed evaporation-induced self-assembly (EISA) as a robust and efficient means to create porous and composite thin film and particulate nanostructures with optimized properties and/or complex functionalities. Examples include, 1) materials that optimize low dielectric constant and high mechanical modulus for so-called low *k* dielectrics needed for future generations of ICs, 2) reversible molecular valves and synthetic channels for regulating transport as in natural ion channels, 3) patternable, self-cleaning superhydrophobic surfaces that mimic those of the lotus plant and desert beetle, 4) unique nanocomposites in which living cells direct the assembly of inorganic nanostructures, and 5) porous nanoparticle supported lipid bilayers (aka 'protocells') - a new class of targeted nanoparticle delivery agents that compared to liposomes have increased capacity, stability, and targeting affinity, which combine show a million-fold greater killing efficacy against drug resistant cancer.

## Donnerstag, den 15.7.2010
## 14:00 Uhr
## Raum PH 3344

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