Computational and Topological Modeling of Mesophase Carbon Composites

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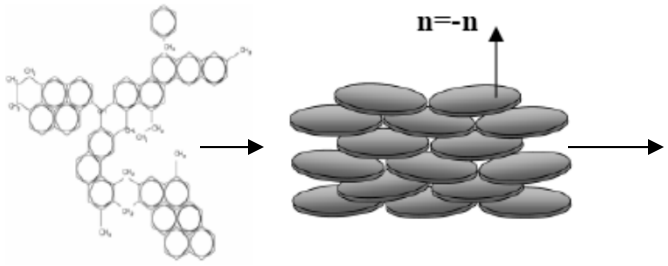
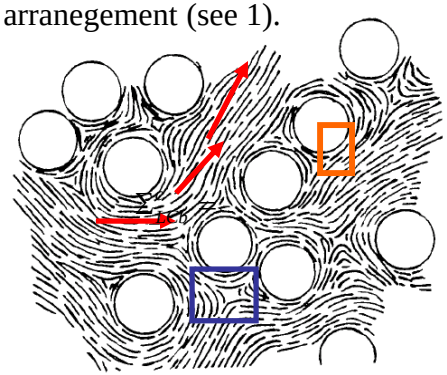
Textures in mesophase pitch carbon/carbon composites are a function of : (1) fiber geometry, (2-3) polydispersity in the precursor petroleum mesophase pitch.

Mesophase Pitch: polycyclic aromatics, of Mw=O(500g/mol) with a discotic nematic phase ; **n** is the average orientation.



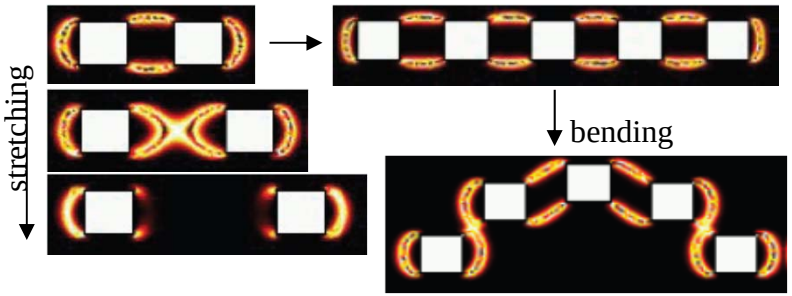
C/C composites : carbon fibers randomly dispersed in a mesophase pitch are an example of anisotropic colloids. ***Inserting fibers into a liquid crystal creates a texture***; the specific textural features depend on the topology of the fiber arranegement (see 1).



Key Characteristics

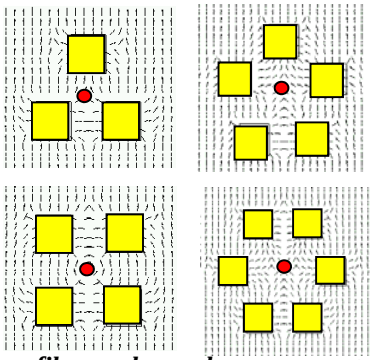
1. Orientation
2. Defect density
3. Anchoring

1. Mutifiber strings



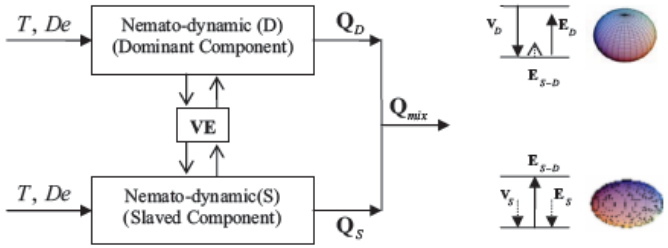
Corner defects in facetted particles in nematics are predicted to promote junctions between particles. The stability of the junctions to stretching and bending is promoted by the line tension.

2. Polygonal nanofiber arrangements



Nanofibers polygonal arrangements give rise to textures w/ odd-even effects

3. Flow of Binary Mixtures



Mesophases are polydisperse. Flow of interacting species result in novel ordering/orientation structures under extensional flow due to coupled nematodynamics.