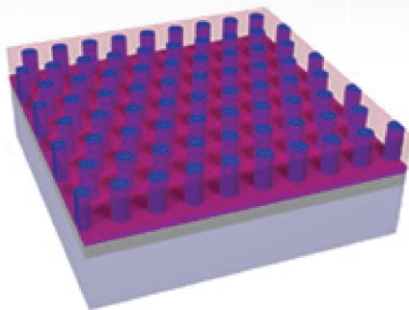
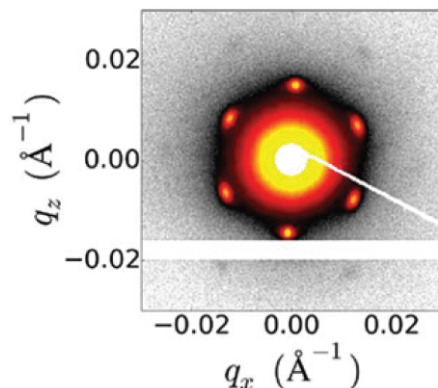


Engineering the Self-Assembly Pathway



Carefully selected pathway yields perfectly aligned nanostructure



By selecting a multi-step process, scientists were able to grow a highly-ordered nanostructure through self-assembly (shown in red and blue). The yellow and red colored image shows the x-ray scattering data the scientists used to verify the order of the structure.

Y. Choo, P.W. Majewski, M. Fukuto, C.O. Osuji, K.G. Yager, *Nanoscale*, **10**, 416-427 (2018)

Work was performed at Brookhaven National Laboratory

Scientific Achievement

A new concept called “pathway-engineering” is described, where a sequence of processing steps is selected based on the ways a material can naturally order, thereby guiding the assembly towards a desired structure.

Significance and Impact

By taking advantage of a material’s natural ordering, scientists can target previously impossible structures, i.e. tailored functionality

Research Details

- Molecules are designed to spontaneously order, but they do not always form the ‘optimal’ order.
- To guide the self-assembly, this study demonstrated how a “pathway” can be chosen to form the desired order.
- Through a series of processing steps, a block copolymer was guided into a desired shape.
- CFN Materials Synthesis facilities were used to fabricate the nanostructures. Materials were measured at the CMS beamline, which is operated by partnership between CFN and NSLS-II.