

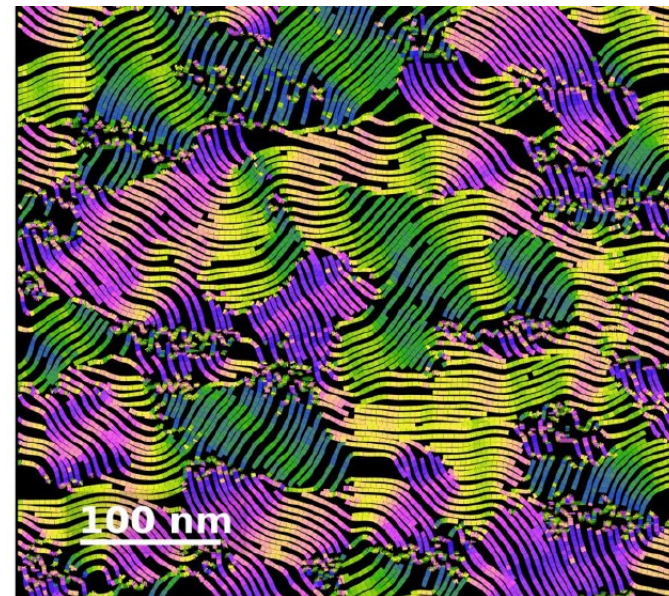
Paul Voyles, Mark Ediger, Lian Yu, U. Wisconsin-Madison

Organic semiconductors are key materials for electronic displays, organic electronics, and other technologies. How the component molecules fit together to make the material is critical to how it conducts electricity and emits and absorbs light. Often, well-ordered, straight molecular packing is beneficial.

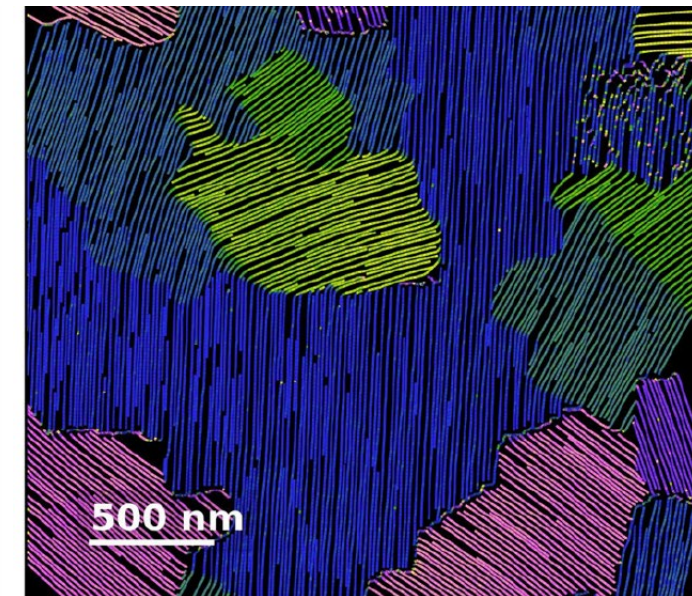
Wisconsin MRSEC researchers have developed a new way to see how molecules fit together with an electron microscope. They used the method to see how molecules rearrange when an organic semiconductor is heated. A modest change in temperature creates significantly improved molecular alignment. The improved alignment is reflected in both larger aligned regions and straighter lines of molecules inside each region.

The alignment of the molecules occurs because higher temperature lets them move to more ordered states. Wisconsin MRSEC researchers are inventing new ways to control molecule mobility, enabling new organic and inorganic materials for a variety of applications.

lower temperature



higher temperature



Visualizations of experimental data on molecular packing. The lines track the local molecular orientation. (left) Low temperature processing results in small regions of aligned molecules with high internal bending. (right) Heating by just 60 °C results in much larger aligned regions with much straighter internal structure.