标题: Spectrometer reveals nano-morphology

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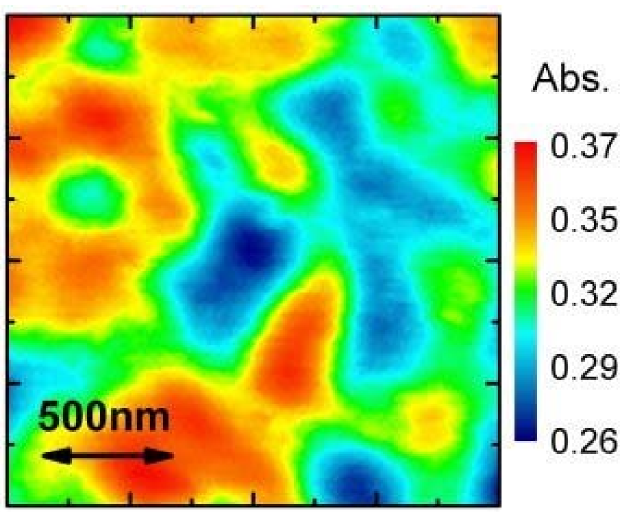
Spectrometer reveals nano-morphology

nanost-admin(金币 +1): 感谢参与和分享!我稍稍修改了一下，图更大一些。

Understanding the morphology of organic semiconductors is essential for designers looking to squeeze the most out of "plastic electronics" such as LEDs, lasers, photovoltaic cells, field-effect transistors and all-organic integrated circuits. It's a difficult task to make sense of the blends of different molecules, but help is at hand thanks to the work of German and Italian scientists.



The group used its NSOM spectrometer to image a thin film of oxotitanyl phthalocyanine, which is a promising candidate for organic photovoltaics.

Researchers from the Max Born Institute – Berlin, the Carl von Ossietzky University of Oldenburg and the Polytechnic University of Milan have developed an absorption spectrometer that can pinpoint variations in the local composition of polymeric or other optoelectronic materials with a spatial resolution of 100 nm. To top it all, the group's set-up is fast.

"Using a broadband source and a special CCD spectrometer, we have managed to record a full transmission spectrum at one spatial position within less than 0.1 s," Christoph Lienau of the University of Oldenburg's ultrafast nano-optics group told *nanotechweb.org*. "This means that we can record a full image of 100 × 100 local absorption spectra within a quarter of an hour, which greatly reduces the risk of photodamage to the sample." Previously, it could take scientists several hours to capture similar data, with each wavelength requiring a few minutes of acquisition time.

Hands on: first author Robert Pomraenke alongside the team's optical apparatus.

The team's apparatus captures absorption spectra over the range 650–950 nm and consists of an aperture near-field scanning optical microscope (NSOM) coupled to an ultra-broadband Ti:Sapphire laser. "At the moment we prefer to use a broadband Ti:Sapphire laser as its spectrum is more homogeneous and more stable than a supercontinuum source," said Lienau. "However, a supercontinuum source has the advantage of an even broader spectral range and we are currently experimenting with such a device."

To push the spectrometer's imaging resolution further down the nanoscale, the group is looking at replacing its metal-coated fibre probe with a sharp gold or tungsten tip. Lienau thinks that this approach could improve the spatial resolution from 100 nm to 20 nm or less.

The researchers presented their work in *Nano Lett.* **7** 998

Source: nanotechweb.org.

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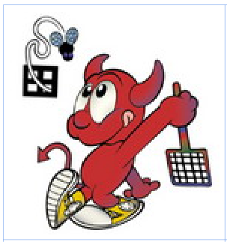

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近場光譜儀可揭露奈米級形貌

對於LED、雷射、光伏電池、場效電晶體等塑膠電子裝置(plastic electronics)的設計者而言，了解幾有機半導體的形貌對於提升系統性能極為重要，然而這類材料往往是由不同的分子混合而成，要分辨它們極為困難，不過最近德國及義大利科學家發展出一種利用光譜儀來分析奈米級形貌的方法，可望解決上述難題。

由Bax Born研究所、歐登堡大學(Ossietzky Unifersity of Oldenburg)及米蘭科技大學組成的研究小組發展出一種吸收光譜儀，可以觀察高分子或其他光電材料的局部組成變化，其空間解析度高達100 nm。最令人振奮的是，該裝置的操作速度相當快。歐登堡大學的Christoph Lienau表示，該小組採用寬頻光圓及特殊的CCD光譜儀，在不到0.1秒的時間內紀錄空間中一點的透射頻譜，這代表他們可以在15分鐘內取得100× 100的局部吸收光譜，由於時間夠短，因此可大幅降低照光對樣品的傷害。

該小組的裝置包含近場掃描式顯微鏡(NSOM)光圈及寬頻的Ti:Sapphire雷射，可以取得波長650至950 nm的吸收光譜。Lienau指出，他們採用Ti:Sapphire雷射是因為相較於超連續光譜光源(supercontinnum source)，前者的光譜較均勻也較穩定。不過由於超連續光譜光源的頻寬更寬，所以該小組目前正以它進行實驗。

為了進一步提高將上述光譜儀的解析度，該小組計畫以更尖的金或鎢針尖來取代原本鍍金屬的光纖探針。根據Lienau的說法，此舉將使解析度由100 nm推進至20 nm或更小。詳見Nano Letters 7, p.998 (2007)。

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