光电流成像系统，拉曼光谱成像系统，PL mapping 系统 三合一！

韩国 NANOBASE 公司专业生产激光扫描光电流成像系统，为科学和工业领域提供最高性价比解决方案。产品具有如下特点：

- **独特的激光扫描技术，具有优异的扫描分辨率和重复性**
  激光扫描分辨率< 0.02 um & 重复性< 0.1 μm
- 体相全息光栅光谱仪
  光透过率>90%，比反射式光栅高30%，信号传输效率更高
- 具有Raman/PL/光电流等多种测量模式
- 结构紧凑，模块化设计
- 扫描速度快，扫描范围大
  200μm x 200μm范围内高速成像 & 2D Mapping (x 40 objective)

产品参数：

	XperRam Compact	Xpl□□□
空间分辨率	400nm	400nm
最低波数	30cm-1	100cm-1
光谱分辨率	1.5cm-1	0.6cm-1
光谱范围	30cm-1 到 6000cm-1	100cm-1 到 3500cm-1
CCD	ICX674，1392X1452 pixels TE 制冷科学级 CCD	1024x256 TE 制冷科学级相机
激光器	532nm，可选配 785	532nm,可选配 785nm
Mapping	拉曼，荧光，光电流	拉曼成像需要额外选购
物镜	10X，40X，100X	10X，50X，100X
光栅	透射式光栅，效率比反射式高 30%	反射式光栅

上表是 XperRam Compact 与某知名公司拉曼光谱仪参数对比

应用实例：

- 光电流成像，大（重）样品测试

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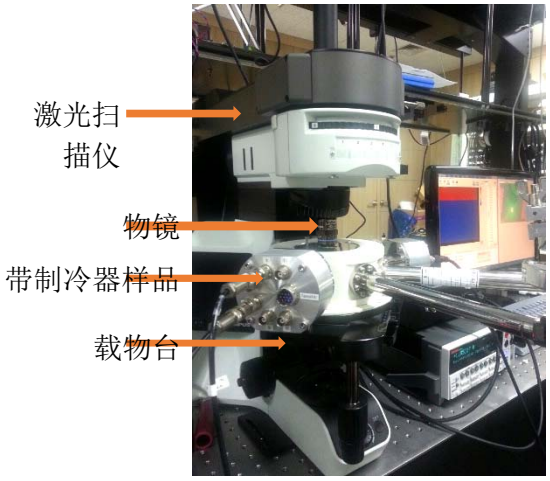
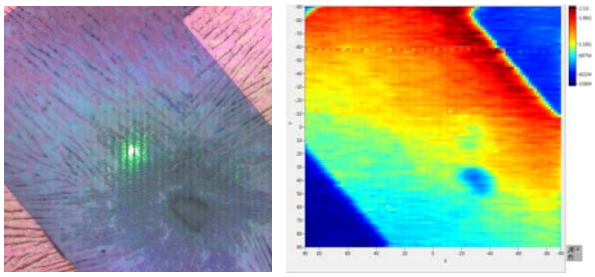
扫描成像，载物台无需移动，故而可以放置很重的样品在载物台上，下图是测量带制冷器的碳纳米管的光电流成像，普通拉曼成像系统无法完成此项测试



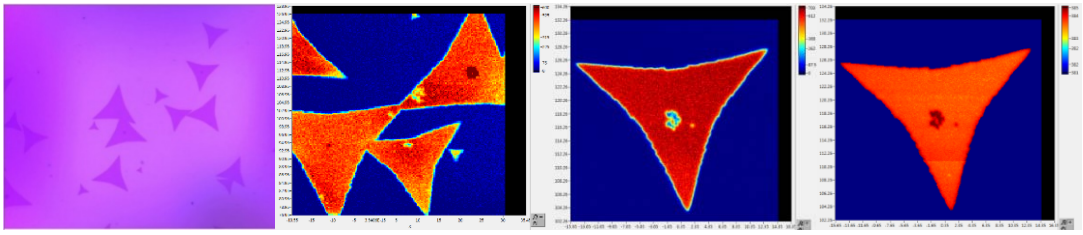


图（a）样品台上放置的带制冷器的碳纳米管的显微图像

图（b）碳纳米管的光电流 mapping 图样，设置为激光扫描区域 180um x180μm，步 2μm

◆ 拉曼成像（二硫化钼）

可任意设置激光扫描范围和扫描步进，激光扫描范围在 40 倍物镜下最大可达 200μm x 200μm，激光扫描步进可低至 0.1μm



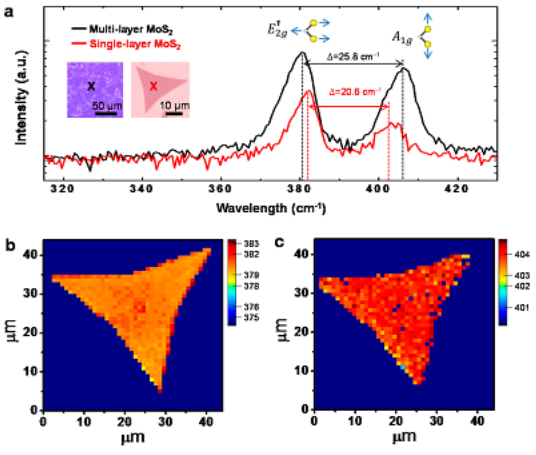
c d e f

图(c)二硫化钼样品的显微图像

图(d)二硫化钼的强度 mapping 成像，设置为激光扫描区域 50um x50μm，激光扫描步进 0.3μm

图(e)二硫化钼的强度 mapping 成像，设置为激光扫描区域 30um x30μm，激光扫描步进 0.1μm

图(f)二硫化钼的频率 mapping 成像，设置为激光扫描区域 30um x30μm，激光扫描步进 0.1μm



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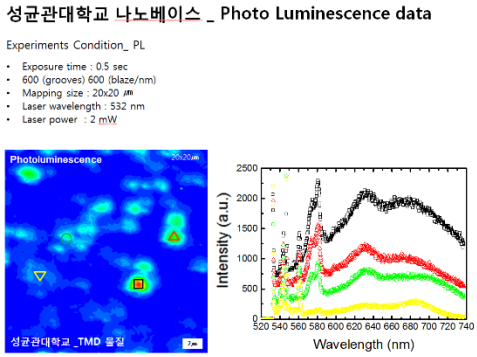
图（g）单层与多层二硫化钼薄膜拉曼成像与拉曼峰频移

◆ 荧光 PL 成像：



发表文献：

（1） A Van Der Waals Homojunction: Ideal p－n Diode Behavior in $MoSe_2$ - Advanced Materials（添加附件链接）

（2） SemiconductorInsulator Semiconductor Diode Consisting of Monolayer MoS^2, h-BN, and GaN Heterostructure －ACS Nano （添加附件链接）

摘要：We propose a semiconductorinsulatorsemiconductor (SIS) heterojunction diode consisting of monolayer (1-L) MoS2, hexagonal boron nitride (h-BN), and epitaxial p-GaN that can be applied to high-performance nanoscale optoelectronics. The layered materials of 1-L MoS2 and h-BN, grown by chemical vapor deposition, were vertically stacked by a wet-transfer method on a p-GaN layer. The final structure was verified by confocal photoluminescence and Raman spectroscopy. Currentvoltage (IV) measurements were conducted to compare the device performance with that of a more classical pn structure. In both structures (the pn and SIS heterojunction diode), clear current-rectifying characteristics were observed. In particular, a current and threshold voltage were obtained for the SIS structure that was higher compared to that of the pn structure. This indicated that tunneling is the predominant carrier transport mechanism. In addition, the photoresponse of the SIS structure induced by the illumination of visible light was observed by photocurrent measurements.
关键词：monolayer MoS2 . h-BN . GaN . semiconductorinsulatorsemiconductor diode . carrier tunneling

（3） Raman Vibrations, Domain Structures, and Photovoltaic Effects in A-Site La-Modified BiFeO3 Multiferroic Ceramics －JACS（添加附件链接）

摘要：Micro-Raman spectroscopy, X-ray diffraction, high-resolution transmission electron microscopy (TEM), oxygen vacancies, synchrotron X-ray absorption spectroscopy, magnetizations, optical band gaps, and photovoltaic (PV) effects have been studied in (Bi1 - xLax)FeO3 (BFO100xL) ceramics for x = 0.0, 0.05, 0.10, and

0.15. XRD, Raman spectra, and TEM confirm a rhombohedral R3c symmetry with the tilted FeO6 oxygen octahedra in all compounds. The low-frequency Raman vibrations become broader and shift toward higher frequency as La3+ increases. Fe K-edge synchrotron X-ray absorptions reveal that Fe3+ valence and Fe－O－Fe bond angle are not modified by the La3+ substitution. All compounds exhibit a linear antiferromagnetic feature. Optical transmission reveals band gaps in the range of 2.22－2.24 eV. The heterostructures of indium tin oxide (ITO) film/(Bi1 － xLax)FeO3 ceramics/Au film show a p－n junction-like I－V characteristic behavior. The maximal PV power conversion efficiency can reach 0.19% in ITO/BFO15L/Au under illumination of k = 405 nm. A junction-like theoretical model can reasonably describe open-circuit voltage and short-circuit current as a function of illumination Intensity

（4） Enhanced photovoltaic effects in A-site samarium doped BiFeO3 ceramics: The roles of domain structure and electronic state － JECS（添加附件链接）

摘要：This work reports enhanced photovoltaic (PV) responses of (Bi1 － xSmx)FeO3 (x = 0.0, 0.05, 0.10) ceramics (BFO100xSm) with ITO film under near-ultraviolet irradiation (┐ = 405 nm). The ceramics were characterized by micro-Raman scattering, high-resolution transmission electron microscopy, and synchrotron X-ray absorption spectroscopy (XAS). A rhombohedral R3c symmetry with tilted FeO6 octahedra has been confirmed. The Fe K-edge absorption spectra reveal a slight shift toward higher energy as A-site Sm3+ substitution increases. The oxygen K-edge XAS reveals an enhancement of hybridization between the O 2p and unoccupied Fe 3d states due to Sm doping. The optical band gaps are in the range of 2.15－2.24 eV. The maximal PV power-conversion and external quantum efficiencies respectively reach 0.37% and 4.1% in the ITO/BFO5Sm/Au heterostructure. The PV responses can be described quantitatively by a p-n-junctionlike model. The domain structures and hybridization between the O 2p and Fe 3d states play important roles for the PV responses.

（5）Raman spectra and structural stability in B-site manganese doped (Bi0.5Na0.5)0.925Ba0.075TiO3 relaxor ferroelectric ceramics － JECS（添加附件链接）

摘要：Soft X-ray absorption (XAS), transmission electron spectroscopy (TEM), Raman spectroscopy, and synchrotron XRD have been studied in B-site 0－2 mol% manganese (Mn) doped (Bi0.5Na0.5)0.925Ba0.075TiO3 (BN7.5BT) relaxor ferroelectric ceramics. High-resolution synchrotron XRD and TEM reveal two phase coexistence of rhombohedral R3c and tetragonal P4bm structures in 0 and 0.2%, and an orthorhombic structure in 1 and 2% Mn-doped BN7.5BT at room temperature. Raman spectra of 0% Mn reveal structural transition from two phase coexistence to tetragonal phase near 190 ◦C with a softening anomaly, while 0.2－2% Mn-doped BN7.5BT show softening behavior near 290 ◦C upon heating. Raman spectra and synchrotron XRD indicate that Mn doping

can enhance structural thermal stability in BN7.5BT ceramics.
关键词：Relaxor ferroelectric ceramics; Raman spectroscopy; Synchrotron XRD; Phase transition

（6）Raman vibrations and photovoltaic conversion in rare earth doped (Bi0.93RE0.07)FeO3 (RE¼Dy, Gd, Eu, Sm) ceramics - CERAMICS INTERNATIONAL（添加附件链接）

摘要：High-resolution Raman spectra, X-ray diffraction, oxygen vacancies, synchrotron X-ray absorption spectroscopy, magnetization, optical bandgap, and photovoltaic (PV) conversion have been studied in BiFeO3 (BFO) and (Bi0.93RE0.07)FeO3 (RE¼Dy, Gd, Eu and Sm) multiferroicceramics (7%Dy－BFO, 7%Gd－BFO, 7%Eu－BFO, and 7%Sm－BFO). 7%Dy－BFO exhibits a weak ferromagnetic behavior instead of the linearantiferromagnetic responses found in the other compounds. Optical transmissions reveal band gaps of 2.20－2.21 eV, which are slightly smallerthan 2.24 eV in pure BFO. The current vs. voltage (I－V) characteristic curves of indium tin oxide (ITO)/(Bi0.93RE0.07)FeO3 ceramics/Auheterostructures suggest a p－n-junction-like behavior. The maximal PV power-conversion efficiencies under illumination of λ¼405 nm in ITO/7%Dy－BFO/Au, ITO/7%Gd－BFO/Au, ITO/7%Eu－BFO/Au, and ITO/7%Sm－BFO/Au respectively reach 0.22%, 0.35%, 0.27%, and 0.24%,which are much larger than 0.017% in ITO/BFO/Au. The PV open-circuit voltage and short-circuit current can be reasonably described by ajunction model as a function of illumination intensity.
关键词：Rare-earth doped BiFeO3 ceramics; Raman vibration; Structure; Optical band gap; Photovoltaic conversion

应用领域：

材料学，功能材料，纳米材料，二维材料（石墨烯，二硫化钼等），铁电陶瓷等
生物医学，细胞成像，疾病检测，皮肤分析等
半导体，太阳能电池和 OLED 等