Effect of oxygen flow rate ratio on crystalline phase and properties of copper oxide films prepared by room-temperature high-power impulse magnetron sputtering

一.成果完成人及所在单位：黄杰，朱润峰，徐新浩 光电与通信工程学院

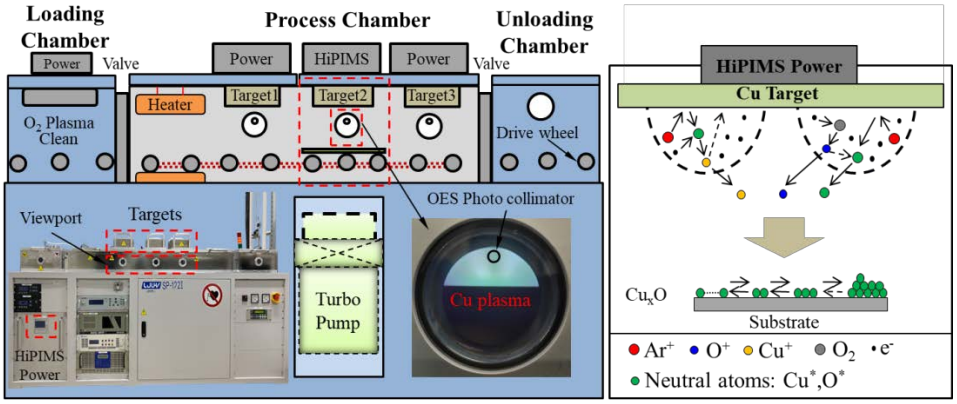
指导教师：赵铭杰

二.成果简介：

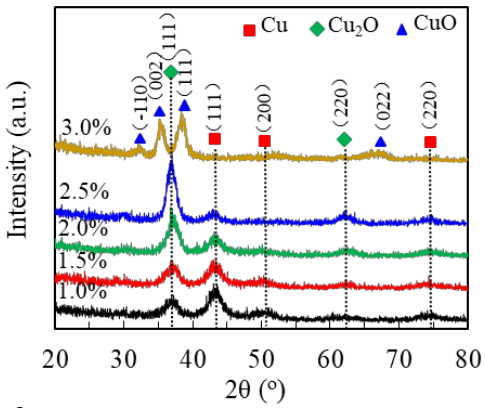
Most of the currently used oxide semiconductors are naturally n-type conductive. The lack of p-type oxide semiconductors hinders the way for oxide semiconductors to be applied in some essential areas such as transparent p-n junction and complementary metal oxide semiconductor (CMOS) device. Developing high performance p-type oxide semiconductors is difficult but crucial for oxide semiconductor based bi-polar devices such as p-n junction and complementary metal oxide semiconductor (CMOS).

三.主要研究内容及创新点：

1. Cuprous oxide (Cu_2O) film was prepared by an in-line HiPIMS system with a high deposition rate of 40 nm/min.
2. The influences of oxygen flow rate ratio (FRR) on the crystalline phase and properties of the film were investigated.
3. Conductivity type transition and crystalline phase transition occurred at a low O_2 FRR of 2.0% and 3.0%, respectively.
4. The optimal film properties (μ=32 $cm^2/V{\cdot}s$, N_c=4.0×10^{15}/cm^3) is suitable for p-type FET application.



Structure chart of the film deposition system and depiction of film growth



XRD spectra of the copper oxide films

四. 主要研究成果及应用情况

1.已在 SCI 收录期刊《Surface and Coatings Technology》上发表学术论文一篇（中科院 2 区），论文索引：Surface & Coatings Technology 434 (2022) 128215. DOI 10.1016/j.surfcoat.2022.128215

学生作者：黄杰； 指导老师：赵铭杰

联系人：黄杰 电 话：13913023958 E-mail: huangjie@stu.xmut. edu.cn