

## N型晶体硅电池——高效晶体硅太阳能电池

N型硅衬底的优点：N型硅（n-Si）相对于P型硅来说，由于对金属杂质和许多非金属缺陷不敏感，或者说具有很好的忍耐性能，故其少数载流子具有较长而且稳定的扩散长度。

目前只有Sunpower和sanyo两家企业N型Si衬底生产高效太阳能电池做得较好。英利“熊猫”N型单晶硅高效电池项目填补了国内N型电池技术的空白。

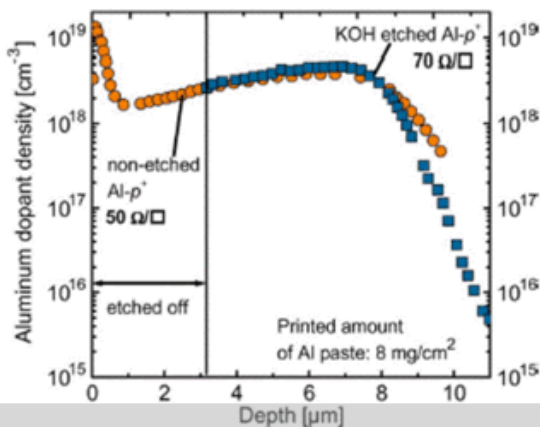
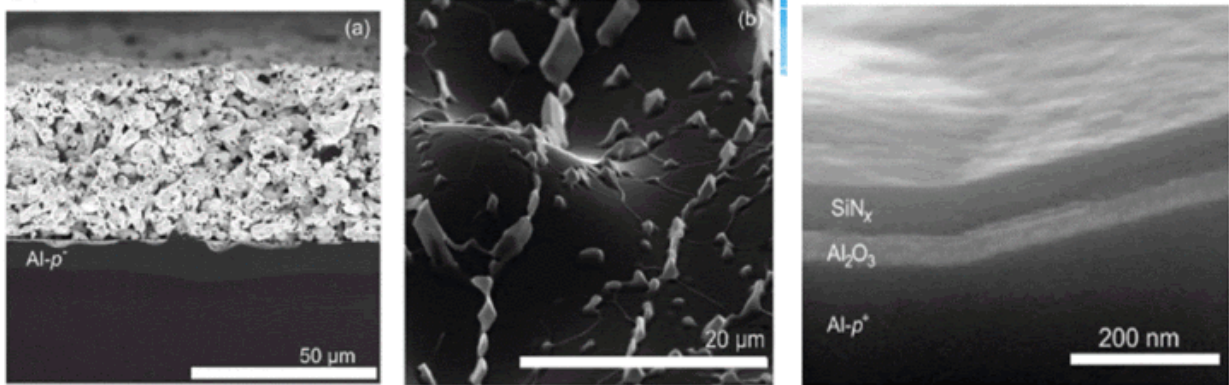
如何在N型硅衬底上实现PN结：硼扩散制结、非晶硅/晶硅异质结以及Al扩散制结三种基本方法。

硼扩散制结需要高温，高温是太阳能电池制备工艺最忌讳的！

HIT电池只有Sanyo做得较好，没有推广。

Al推进制结目前受到普遍关注，因其价格低廉而又容易实现。具体工艺参数信息见附图，对专业人士很有参考价值。（作者 和海一样的新能源 [微博](#)）

### Al推进形成PN结

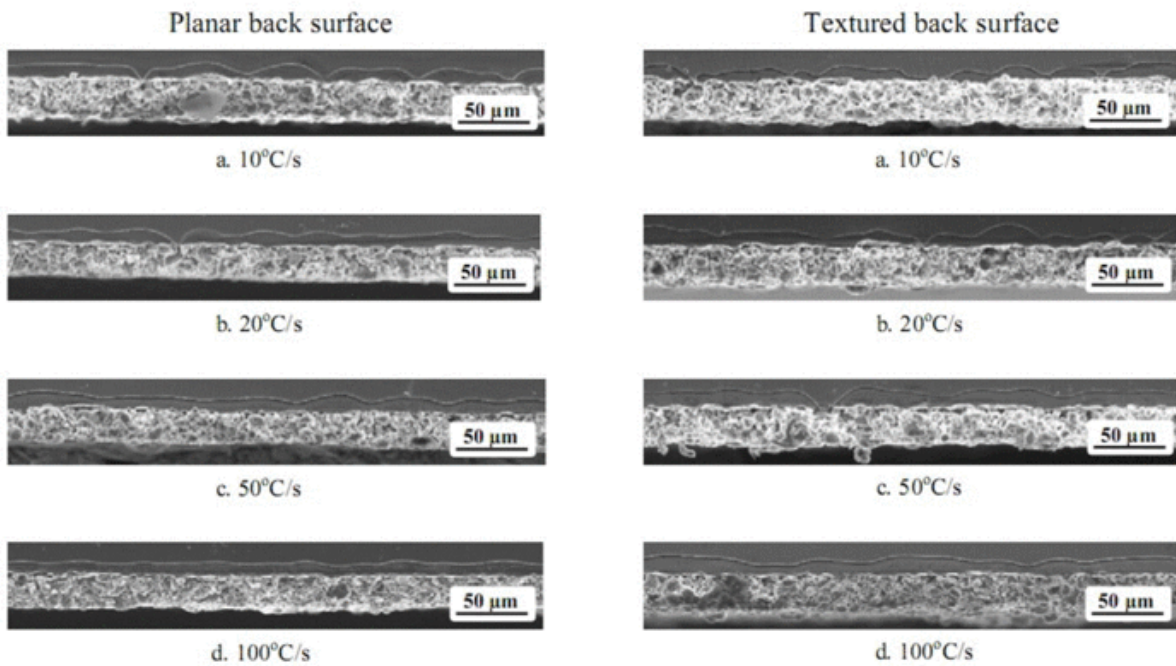


| Cell ID | $V_{oc}$ [mV] | $J_{sc}$ [mA/cm <sup>2</sup> ] | FF [%] | $\eta$ [%] |
|---------|---------------|--------------------------------|--------|------------|
| P01     | 649           | 39.1                           | 77.5   | 19.7* [21] |
| P25     | 636           | 39.5                           | 79.5   | 20.0*      |
| P15     | 639           | 39.9                           | 77.2   | 19.7*      |

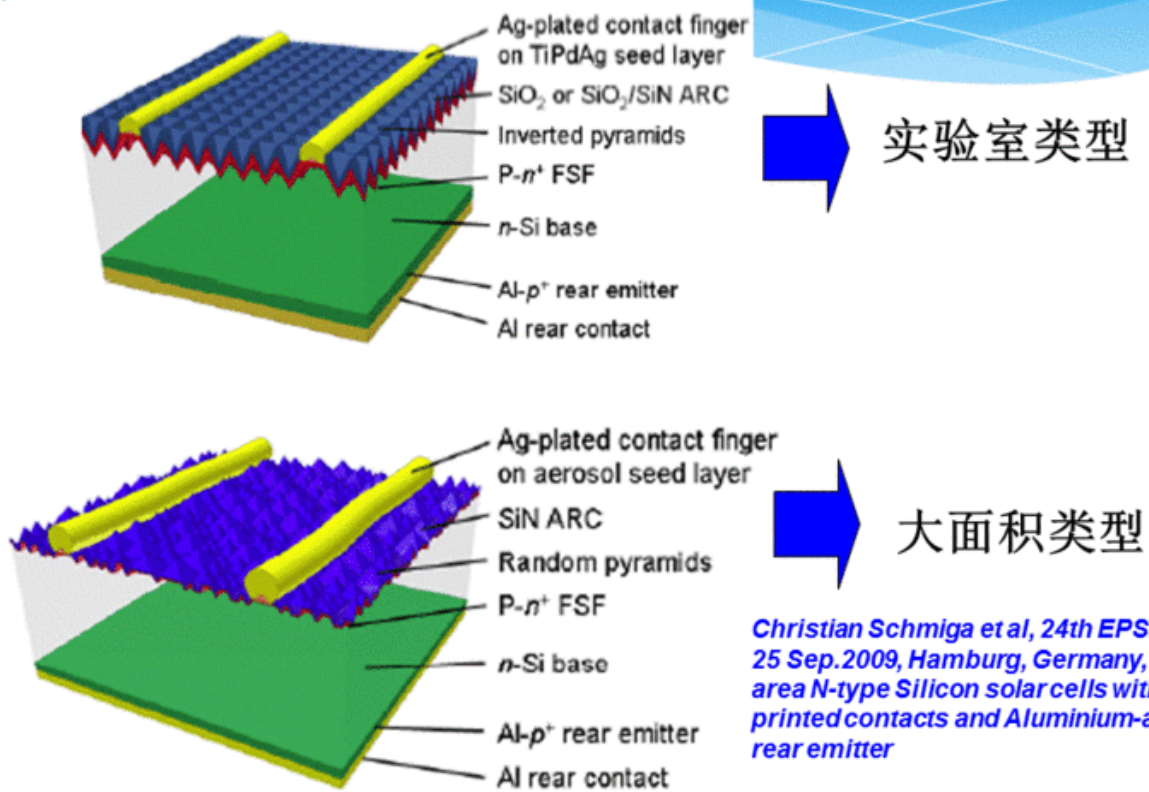
\* independently confirmed at Fraunhofer ISE CalLab

*R. Bock, IEEE TED, vol.57, No.8, 2010, The ALU+ Concept: N-Type Silicon Solar Cells With Surface-Passivated Screen-Printed Aluminum-Alloyed Rear Emitter*

## 退火处理及方式对开路电压等有着重要影响

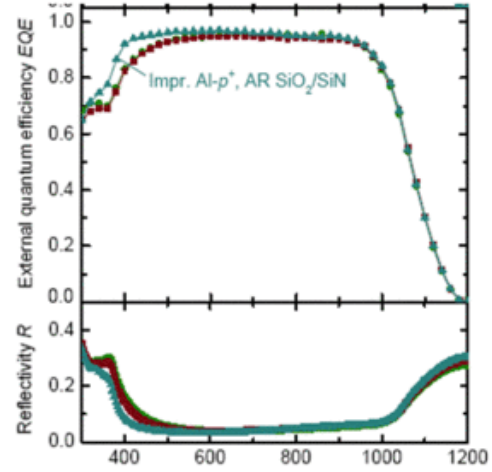
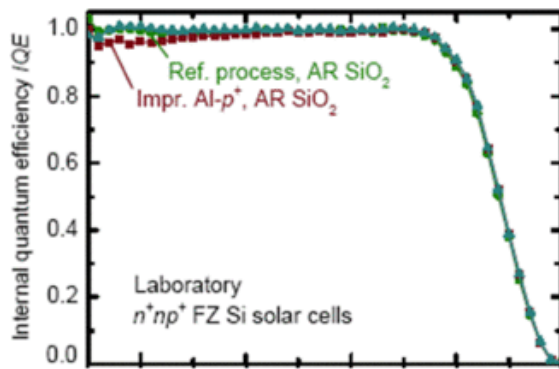


## AI推进形成背发射极PN结



| Cell type  | Cell area [cm <sup>2</sup> ] | Front contact grid                      | Further details                                                  | V <sub>oc</sub> [mV] | J <sub>sc</sub> [mA/cm <sup>2</sup> ] | FF [%] | η [%] |
|------------|------------------------------|-----------------------------------------|------------------------------------------------------------------|----------------------|---------------------------------------|--------|-------|
| Laboratory | 4.0 (aperture)               | Evaporated TiPdAg seed layer, Ag-plated | Reference process [2], AR SiO <sub>2</sub>                       | 625                  | 38.4                                  | 79.1   | 19.0* |
|            |                              |                                         | Improved rear Al-p <sup>+</sup> , AR SiO <sub>2</sub>            | 640                  | 37.9                                  | 79.4   | 19.2* |
|            |                              |                                         | Improved rear Al-p <sup>+</sup> , AR 10 nm SiO <sub>2</sub> /SiN | 642                  | 38.7                                  | 79.6   | 19.8* |
| Industrial | 148.5 (total)                | Aerosol-printed seed layer, Ag-plated   | AR SiN                                                           | 632                  | 36.0                                  | 80.0   | 18.2* |

\* Confirmed at Fraunhofer ISE CalLab, Freiburg, Germany



表面钝化效果非常好

原文地址：<http://www.china-nengyuan.com/news/37443.html>