

# The Vertical Graphene Sheets as the Electrodes of Supercapacitor

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## Abstract (Arial 10)

Graphene, has attracted tremendous attention and research interest, owing to its exceptional physical properties, such as high electronic conductivity, good thermal stability, high surface area and excellent mechanical strength [1]. Due to these excellent properties, graphene is very suitable to be energy storage material. In traditional, electrode setup should added binder and electroconductive additives and its potential window is smaller than 3V [2]. This research uses vertical graphene sheets (VGs) which are produced by MPT CVD tool to be supercapacitor electrodes. The growing mechanism is shown as figure 1(a). The film quality is characterized by Raman which is shown in figure 1(b). It doesn't need to add binder and electroconductive additives because its good electric conductivity and adhesion can improve capacity performance. Such VGs electrodes had assembled as a cell module. The electrochemical measurement result showed a high potential window 3.7V which is shown in figure 2(a). Through N-doped to modify VGs can increase capacity to 136 F/g, its energy density and power density can reach 58 Wh/kg and 1200 W/kg. A cycle life test showed it after 250 cycles charge –discharge can maintain its capacitance 90% which is shown in figure 2(b).

## References

- [1] A.K. Geim, K. S. Novoselov. Nature materials 6 (2007) 183-191.  
[2] H.-H. Shen, C.-C. Hu, Journal of the Electrochemical Society 161 (2014) A1828.

## Figures

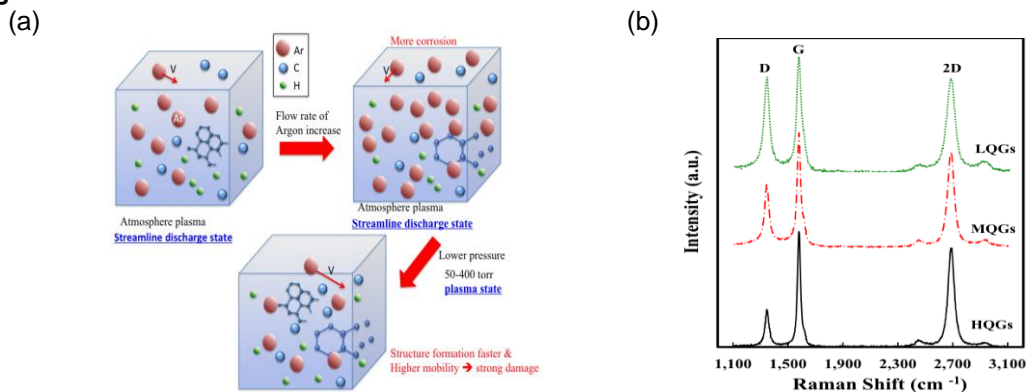


Figure 1(a) shows the growing mechanism, and figure 1(b) shows the Raman signal of vertical graphene sheets.

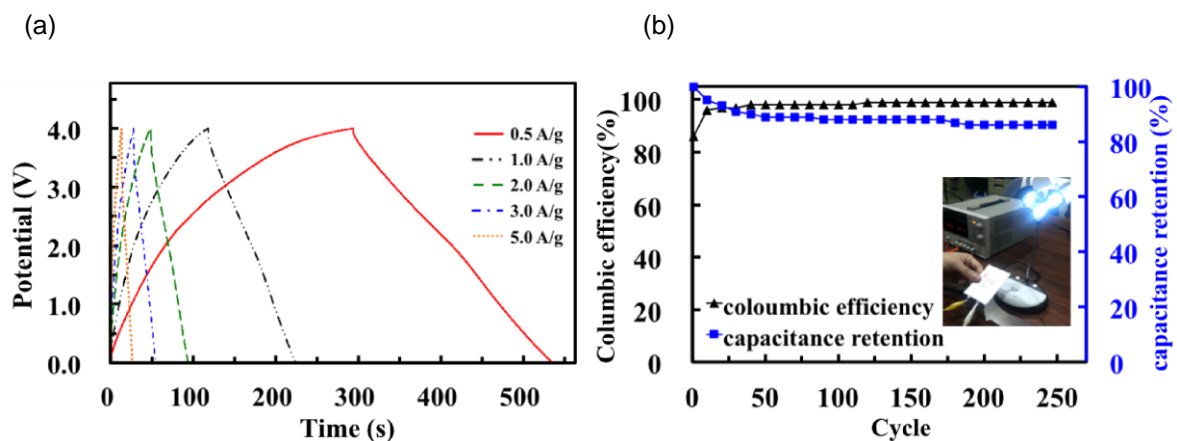


Figure 2(a) shows the electrochemical measurement result, and figure 2(b) shows the retention rate result of the cell module.