The Oxygen Reduction Electro catalyst
Using Pig Blood Pyropolymer As the Precursor
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calls for the solid state method for 30 min until
had occurred at this catalyst, except for its high cost [1].
non-precious metal catalysts (NPMCs) have become the most
promising alternative catalyst for oxygen reduction, since
firstly reported the ORR electrocatalysis of cobalt
phthalocyanine in alkaline solution [2]. A large amount of
catalytic materials have also been exploited for reducing
or replacing the Pt/C catalyst, especially for carbonaceous
ORR-active materials. It is indispensable to point out that
further research would be also required to promote the
ORR activity and their stability, except that they are
commonly synthesized by expensive and complex techniques.
In this work, we performed the partial pyrolysis of pig blood below 600 °C under the N₂ atmosphere with a flow rate of 0.5 L/min to form the pyropolymer (PP), which is an intermediate substance between a polymer and carbonaceous material. After doing this, a mixture containing the PP and carbon black (Vulcan XC-72R) has been milled by solid state method for 30 min until obtaining the homogeneous compound as the precursor, and then it was further pyrolyzed in a tube furnace at 700, 800, 900, 1000 and 1100 °C for 2 h under the N₂ atmosphere with a flow rate of 1 L/min. For convenience, based on the PP obtained at 350 °C, the catalyst further produced at 900 °C is hereafter called PB350900, and the others are named in a similar manner. Then, the samples were applied on the glass carbon electrode substrate with 5 mm diameter and their electrochemical activity was tested by linear voltammetric method. In addition, some detailed studies were also carried out for obtaining the catalyst with higher ORR activity and better stability, which could compare favorably with the Pt/C catalyst.

Figure 1 showed the ORR activity curves of the catalysts prepared with different pyropolymers recorded in O₂-saturated 0.1 M KOH solution at 5 mV/s.

Figure 2: XRD patterns of the catalysts prepared with different pyropolymers.

References