CHAPTER VII

CONCLUSIONS

This dissertation is devoted to develop the new technique for preparation of a carbon monolith with hierarchical porous structure without using any templates. The overall perspective of the effective strategy for preparing the carbon monolith in this research is based on two individual steps.

The first step is to prepare the RF gel in a monolithic form by using the carbon precursor which consists of highly through pores in the range of micrometer scale (called the interconnected macroporous structure). The RF gel in a monolithic form can be achieved by two novel techniques. The first technique is the assistance of the ultrasonic irradiation during gel-formation for direct preparing and controlling the interconnected macroporous structure of the RF monolith gel without using any templates, as discussed in Chapter IV already. Whilst the second technique is to induce phase suspension of the RF solution by adding water at nearly complete gel-formation in order to generate the interconnected macropores throughout the internal gel structure by connecting each suspended gel particles altogether. The detail in the second technique is introduced and discussed in Chapter VI already.

The second step is to transform the carbon precursor into the carbon monolith with the heat treatment process. Importantly, the monolithic form consisting of the interconnected macroporous structure of the obtained carbon is required after the process, as well as the porous structure in the range of nanometer scale (called either microporosities or mesoporosities depending on pore size diameter), which can also be generated on the interconnected macroporous surface. In order to achieve the goal in this step, the different heat treatment processes consisting of carbonization with N_2, direct thermal activation with CO_2 and direct chemical activation by compatible $Ca(NO_3)_2$ / CO_2 are investigated. The investigation details are introduced and discussed in Chapter V.