Supporting information

In situ synthesis of well crystallized rhodium sulfide/carbon composite nanospheres as catalyst for hydrochloric acid electrolysis

Yanjuan Li\textsuperscript{a}, Nan Li\textsuperscript{a,}\textsuperscript{*}, Kazumichi Yanagisawa\textsuperscript{b}, Xiang Ding\textsuperscript{c}, Xiaotian Li\textsuperscript{a}

\textsuperscript{a}College of Material Science and Engineering, Key Laboratory of Automobile Materials of Ministry of Education, Jilin University, 2699 Qianjin Street, Changchun, 130012, P. R. China.

\textsuperscript{b}Research Laboratory of Hydrothermal Chemistry, Kochi University, Kochi 780-8520, Japan

\textsuperscript{c}Analysis and Testing Center, General Research Institute for Non-ferrous Metals, No.2 Xin Jie Kou Wai Str., Beijing, 100088, P. R. China

*Corresponding author. Phone: +86 43185094856. Fax: +86 43185094856.

E-mail address: lin@jlu.edu.cn
**Fig. S1** EDX pattern of Rh$_x$S$_y$/C nanocomposite synthesized in i-propanol with S/Rh = 2.25.
Fig. S2 FTIR spectra of pure KBr (a) and rhodium sulfide/carbon composites synthesized in ethanol (b), i-propanol (c), i-amyl alcohol (d), n-butanol (e) and n-propanol (f).
Fig. S3 TEM images of Rh$_x$S$_y$/C nanocomposite synthesized in i-propanol after refluxing in concentrated HCl (a) and aqua regia (b) for 12h.
**Fig. S4** SEM image of Rh₅Sₓ/C nanocomposite synthesized in i-propanol after heat-treatment at 600 °C in Ar.
Fig. S5 Representative SEM images of Rh₃S₉/C nanocomposites synthesized in various alcohols. (a-e) are ethanol, n-propanol, n-butanol, i-butanol, and i-amyl alcohol, respectively.