Synthesis of Metal/C electrocatalysts for seawater electrolysis

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The most important point for the production of hydrogen from seawater electrolysis was to find highly efficient and corrosion-resistant catalysts [1].

For the synthesis of transition metal catalysts such as manganese, cobalt, and their oxides supported on Vulcan XC-72 carbon black, the microwave technique was used in combination with thermal methods [2]. The aim of the study was to apply green synthesis, such as the microwave-assisted method, and to obtain spherical nanoparticles.

In this work, we considered the method and idea for green synthesis of electrocatalysts, improving the performance of Mn- and Co-based materials for OER stability in seawater, and focusing on their electrochemical characteristics. Mn- and Co-based electrocatalysts, which are cost-effective in terms of conductivity and corrosion resistance, are promising catalysts for industrial hydrogen production from seawater.

Table 1. The size of the crystallite.

Sample	Phase	Main direction		Crystallite size (nm)
		°2θ	hkl	
1	Mn_3O_4	36.09	(211)	14
2	$Co(OH)_2$	37.91	(101)	10
3	$MnCo_2O_4$	35.90°	(311)	8

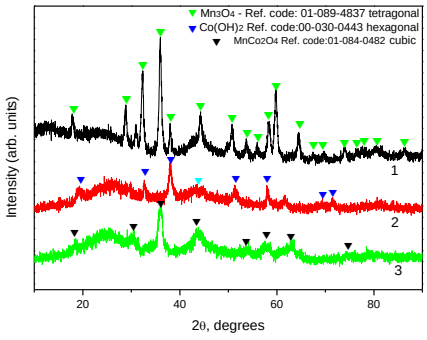

Fig. 1. XRD patern of catalysts synthesis of Carbon(/Vulcan XC-72R)/transition metal.

The electrocatalysts were characterized by X-ray diffraction, energy-dispersive X-ray spectroscopy with scanning electron microscopy, BET surface area, and pore size distribution.

Table 2. BET surface area of Metal oxide/Vulcan XC-72R nanocomposite.

Characteristics	1	2	3
Surface Area (BET), m^2/g	1128	553	856
Average Pore Diameter,(4V/S), nm	4.9	6.4	5.5

Mn and Co nanoparticles were uniformly dispersed on the surface of Vulcan XC-72R. From the newly obtained electrocatalysts, doubly coated electrodes on a nickel mesh were prepared by pressing and heating at 300°C. The fabricated electrodes had a geometric area of 2.5 cm^2.

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References

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