CoNi bimetallic nanofibers by electrospinning: Nickel-based soft magnetic material with improved magnetic properties

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Supporting information

1. The utilized electrospinning setup.

The standard set up of the utilized electrospinning set up to get the CoAc/NiAc/PVA nanofiber mats is illustrated in Fig.1. Fig. 2 shows a photograph.
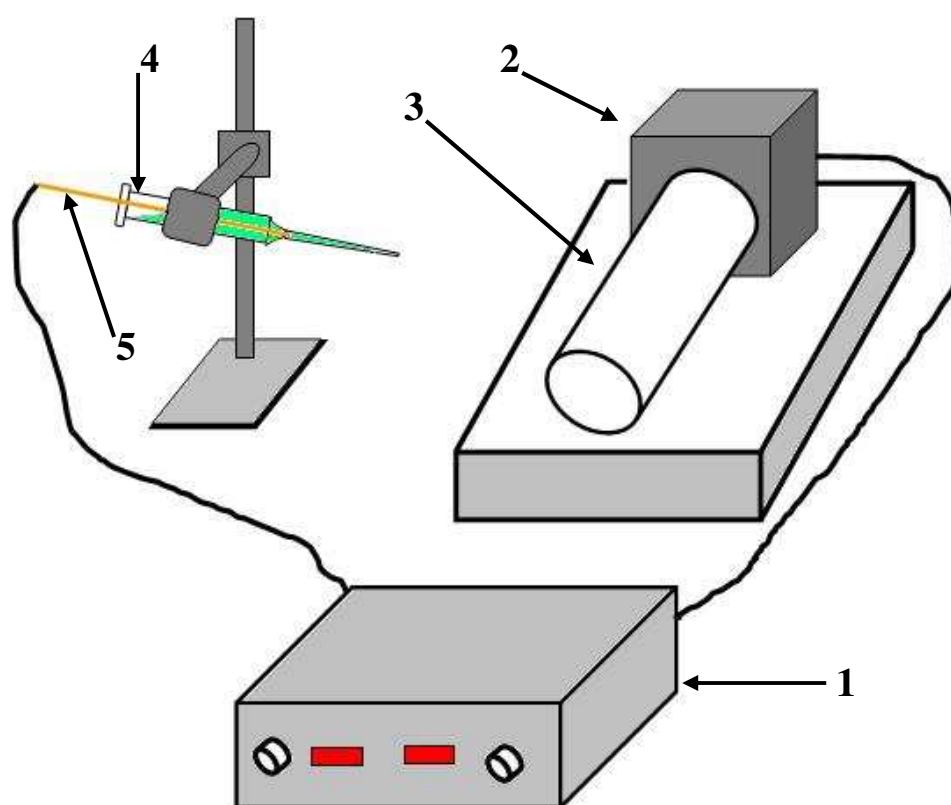

Fig. 1. Schematic diagram of a simple electrospinning spinning apparatus:

    1. DC power supply   2. Electric Motor

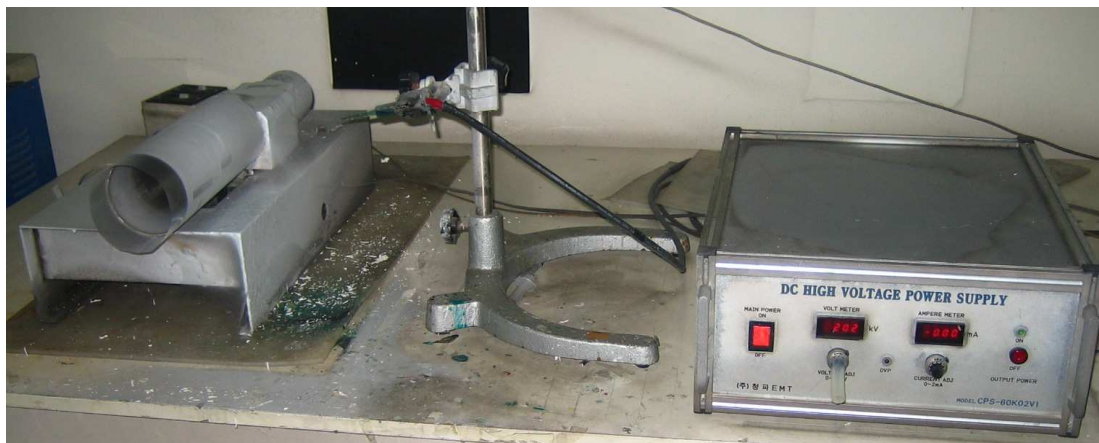   3. Rotating collector   4. Syringe

5. Copper tip

Fig. 2. Normal electrospinning experiment (*Organic and Inorganic Bionanosystem Engineering Lab, Chonbuk National University, Jeonju, Republic of Korea*).

2. Thermogravimetric analysis in argon atmosphere for CoAc/NiAc/PVA electrospun mats

The thermogravimetric analysis in argon atmosphere for the prepared CoAc/NiAc/PVA electrospun mat has been carried out. Figure 3 shows the obtained TGA results and the corresponding first derivative. Consider the big content of PVA in the electrospun nanofibers compared with the other constituents, the strong peak in the first derivative which is observed at ~235 °C can be elucidated as decomposition of this polymer, this explanation is supported by other researchers.[1] It is noteworthy mentioning that, elimination of the polymer in case of NiAc/PVA and CoAc/PVA electrospun mats eventuated at almost same temperature. The peak appears at ~325 °C represents decomposition of CoAc (Eq. 5 and 6) according to the obtained result in

case of CoAc/PVA.[34] A broad peak can be noticed at 430 ^{o}C, this beak is wide because it represents decomposition of both of NiAc (Eq. 1 and 2) which takes place at ~ 370 ^{o}C, and cobalt carbonate (Eq. 7) which occurs at ~ 440 ^{o}C. There is another broad beak at ~520 ^{o}C with an extent of ± 20 ^{o}C, it is expected that the remaining reactions take place within this range; i.e. decomposition of nickel carbonate (Eq.3) and reduction of both of cobalt monoxide and nickel oxide (Eq. 4 and 8).
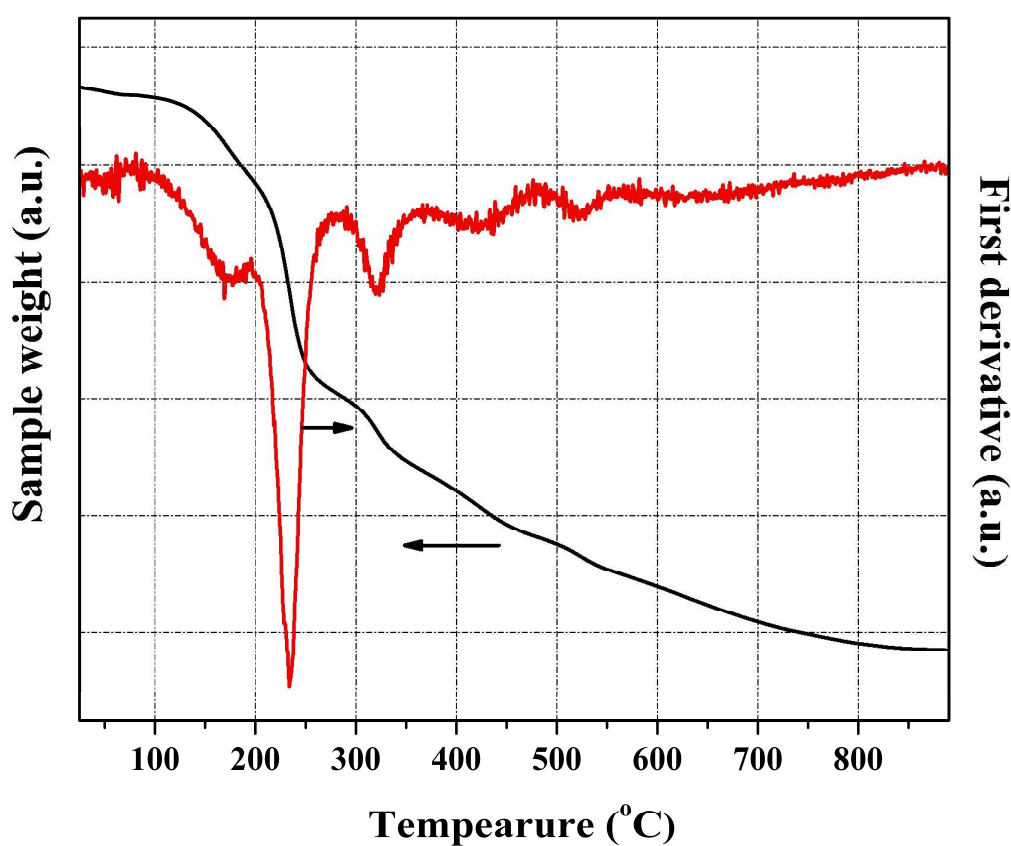

Fig.3 TGA in argon atmosphere of NiAc/CoAc/PVA in argon atmosphere and the corresponding first derivative results.
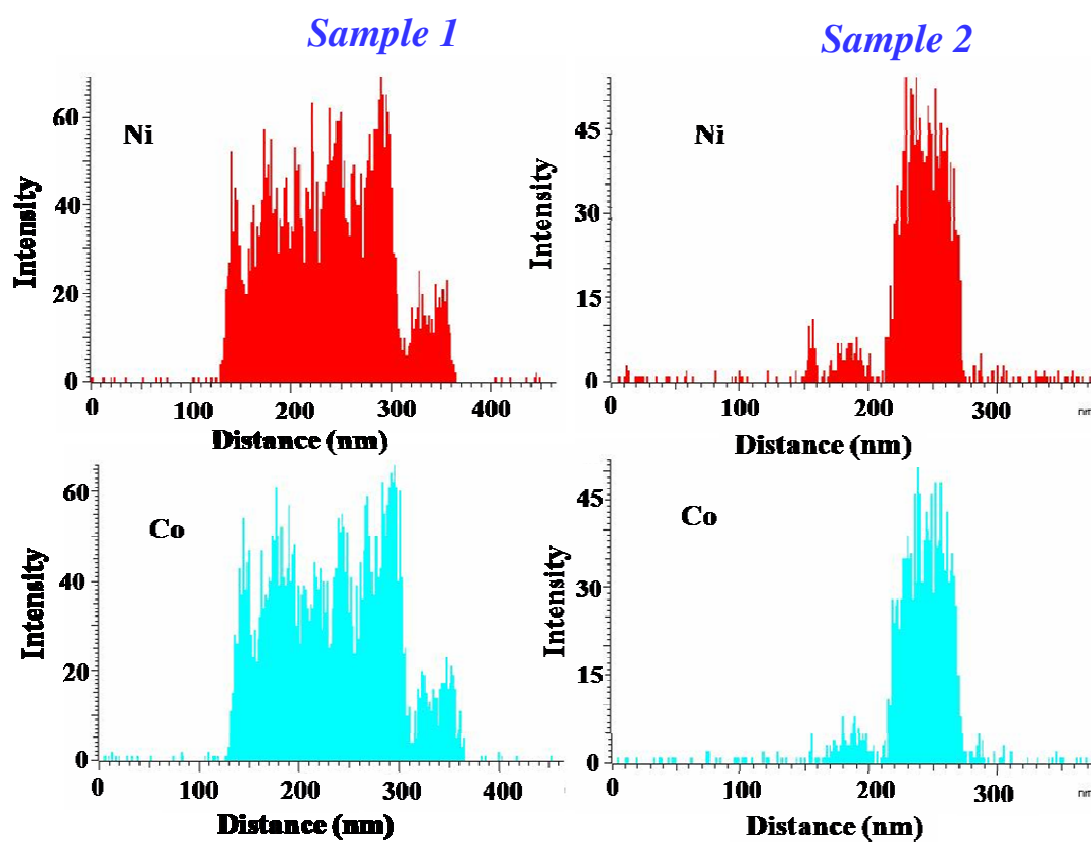
Fig. 4. Line analysis TEM EDX results for different samples from the calcined nanofibers.

1. Fernandes, D. M.; Hechenleitner, A. A. W.; Pineda, E. A. G. *Thermochim. Acta.* **2006**, *441*,101-109.