

## Supplementary Information (SI)

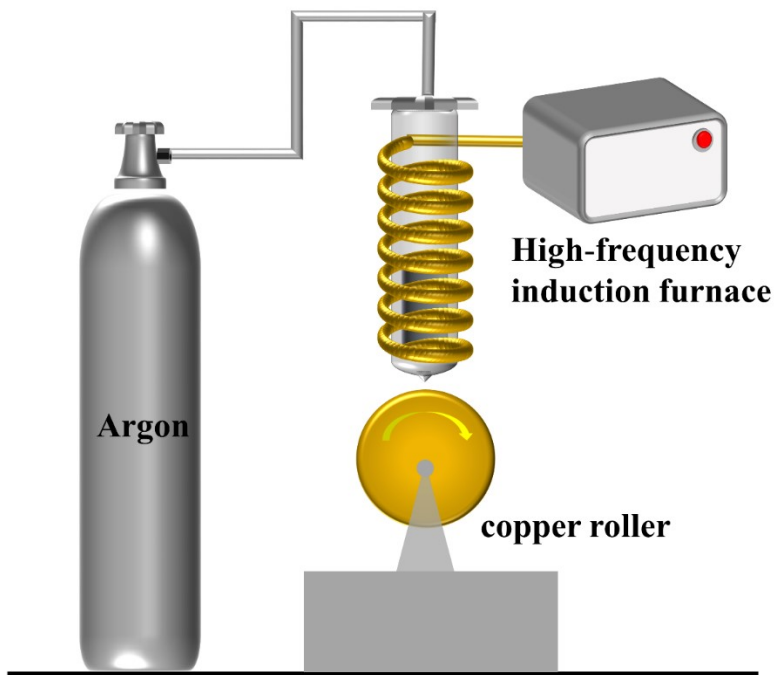
### **Formation, control and functionalization of nanoporous zinc by selective corrosion of Al-Zn alloys with varying compositions**

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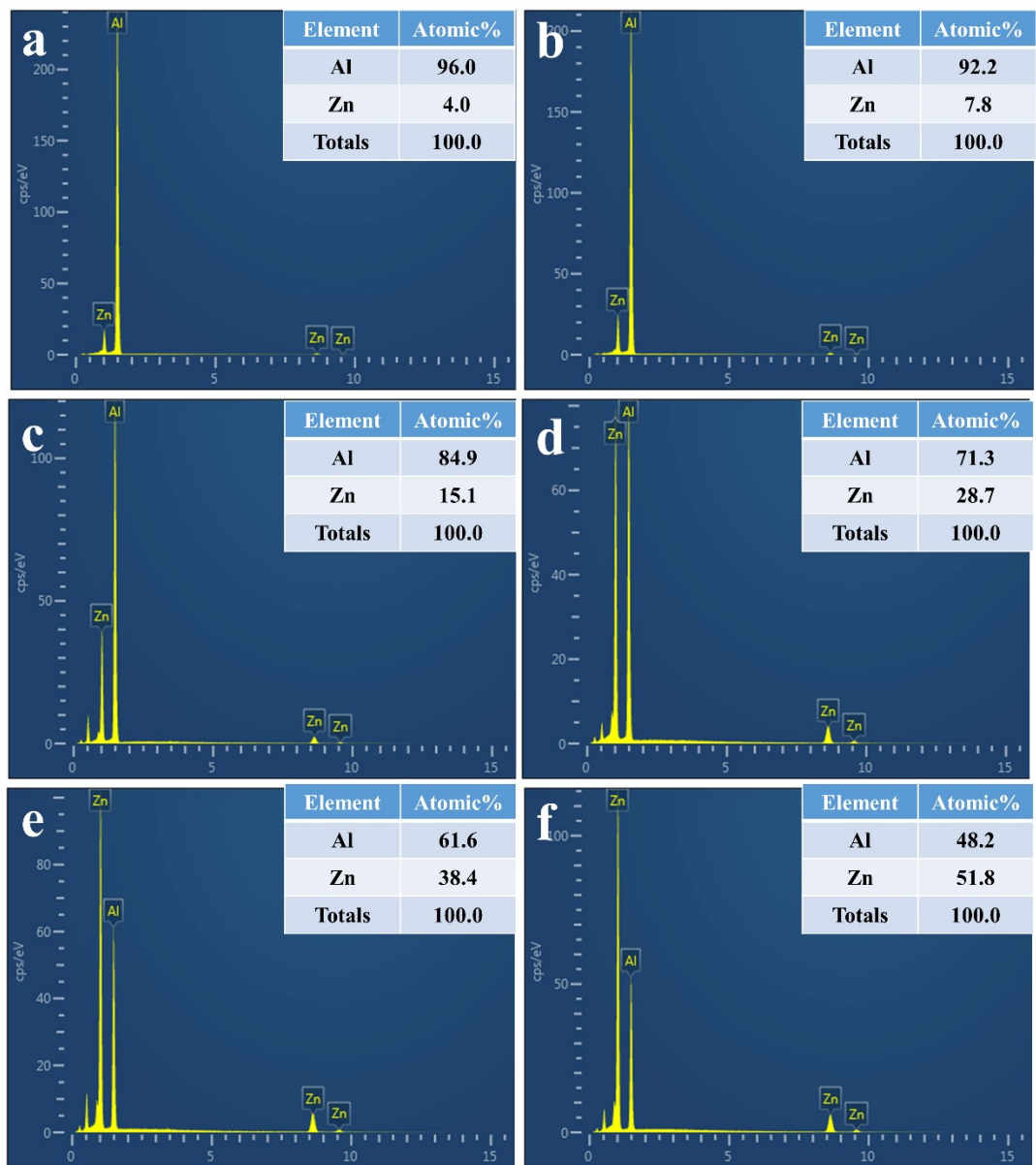
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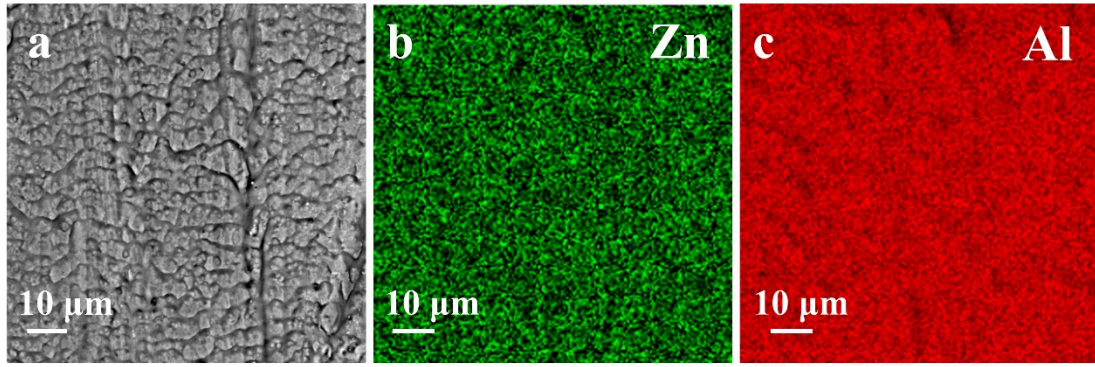


**Figure S1.** Schematic diagram of the melt spinning apparatus.

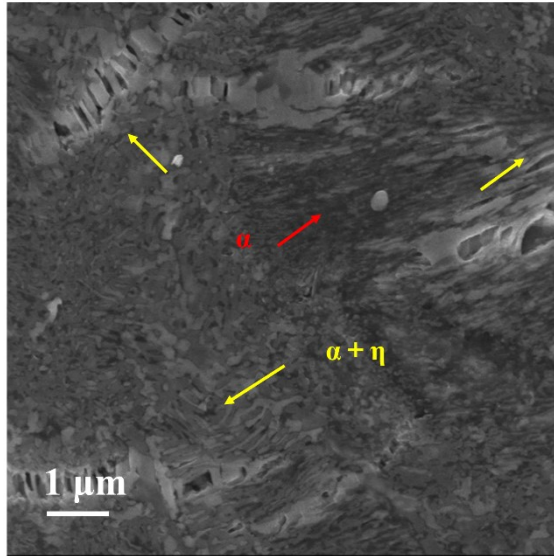


**Figure S2.** EDX spectrums and compositions (insets) of the RS Al-Zn alloys: (a)

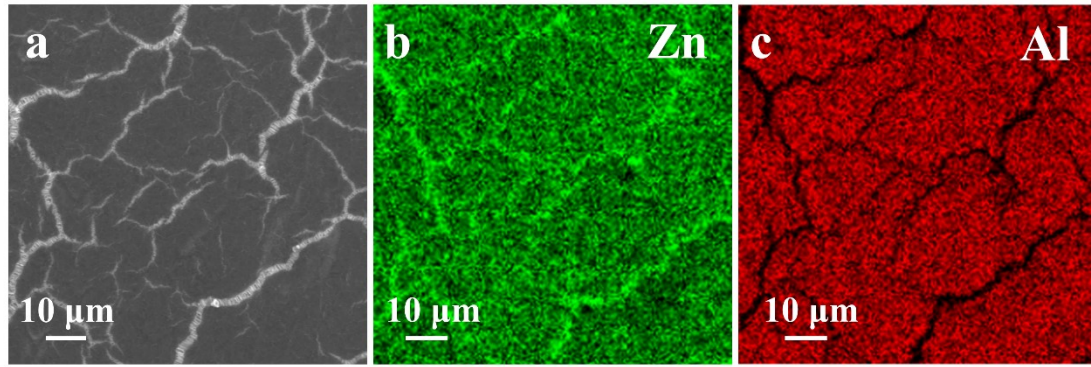
$\text{Al}_{96}\text{Zn}_4$ , (b)  $\text{Al}_{92}\text{Zn}_8$ , (c)  $\text{Al}_{85}\text{Zn}_{15}$ , (d)  $\text{Al}_{70}\text{Zn}_{30}$ , (e)  $\text{Al}_{60}\text{Zn}_{40}$  and (f)  $\text{Al}_{50}\text{Zn}_{50}$ .



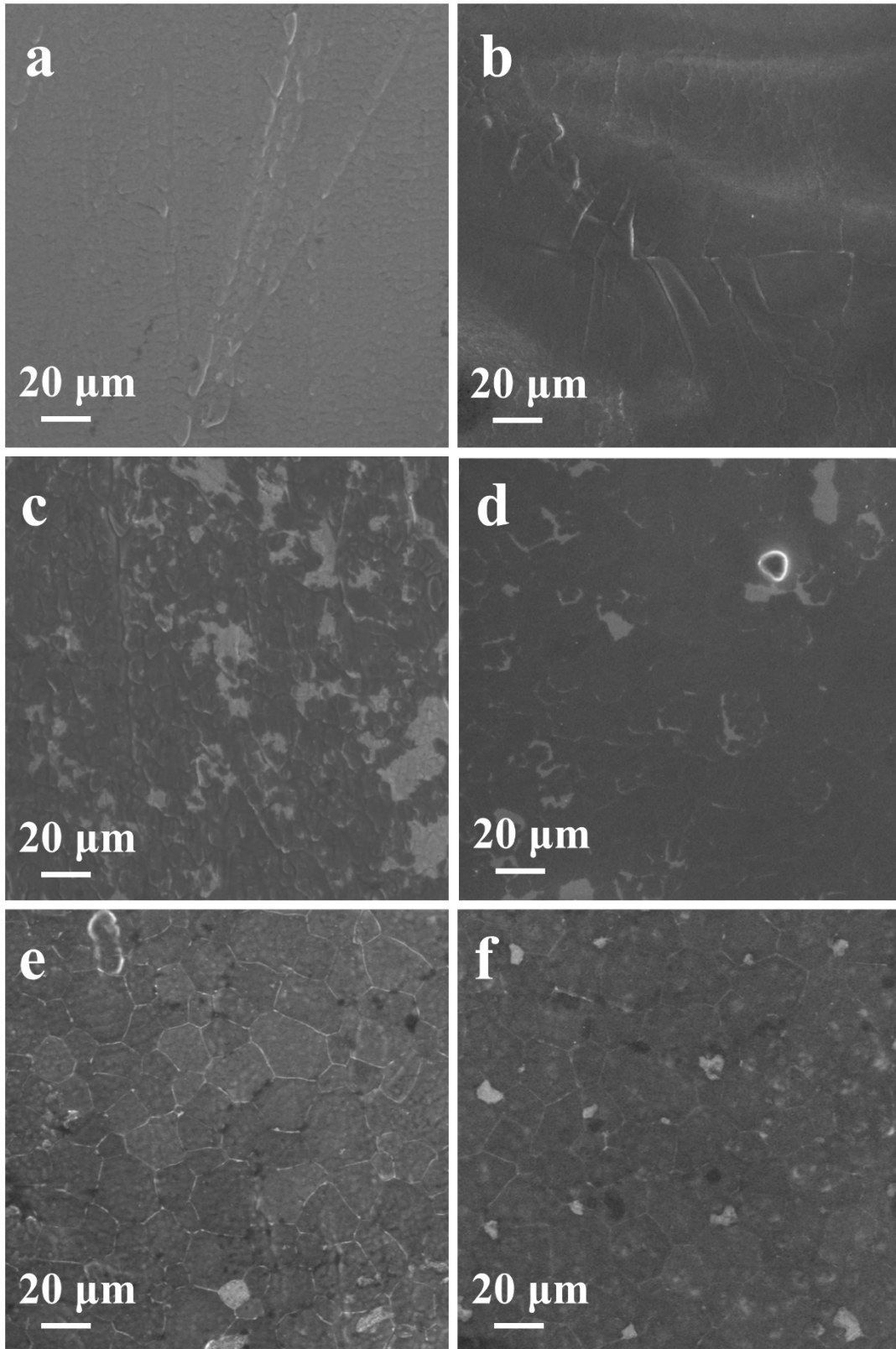
**Figure S3.** (a) BS-SEM image, (b,c) the mapping results of (b) Zn and (c) Al elements of the  $\text{Al}_9\text{Zn}_4$  alloy based on EDX.



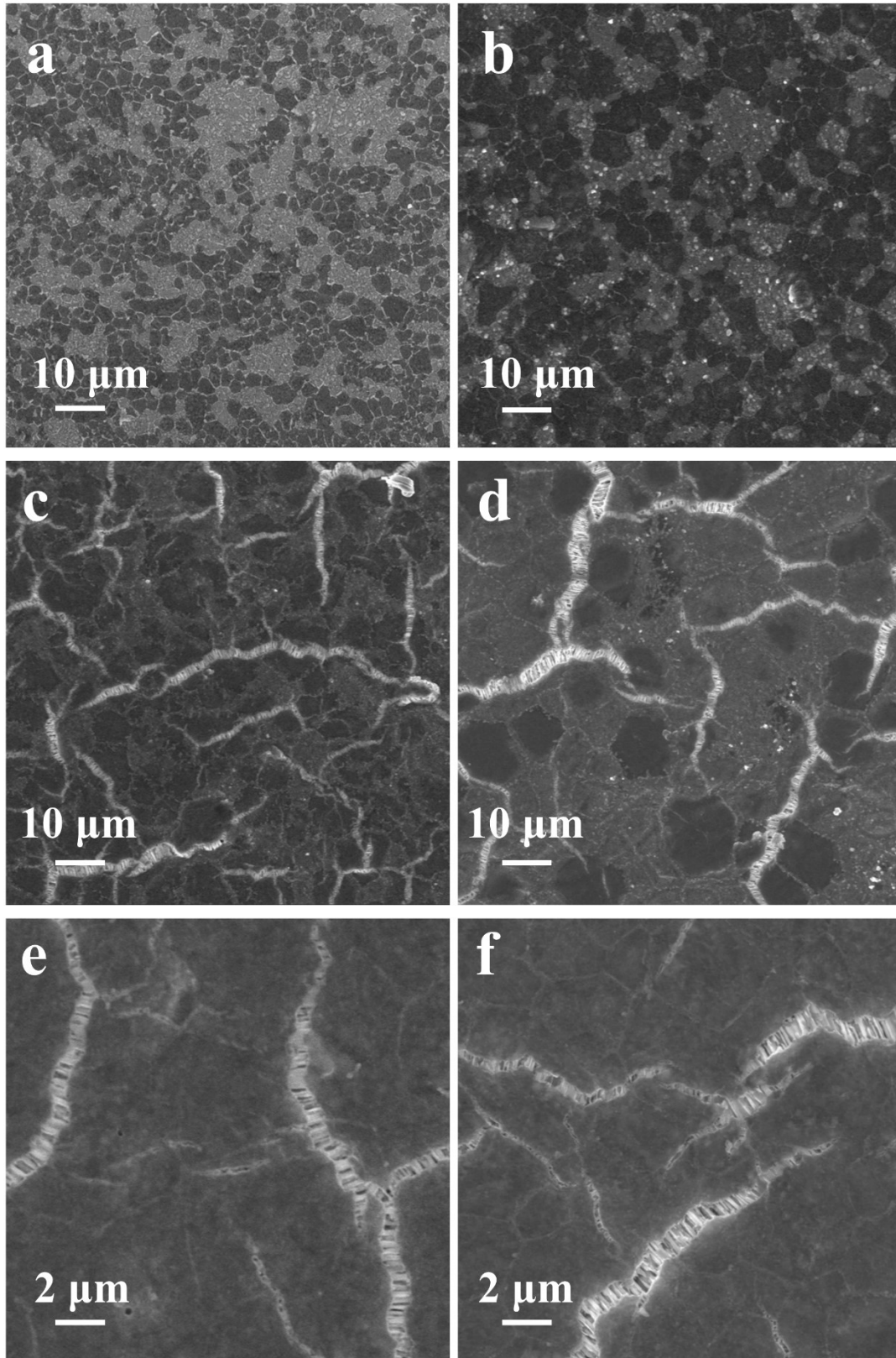
**Figure S4.** The SEM image of matrix and grain boundary microstructure of the Al<sub>60</sub>Zn<sub>40</sub> alloy.



**Figure S5.** (a) SEM image, and (b,c) the mapping results of (b) Zn and (c) Al elements of the  $\text{Al}_{50}\text{Zn}_{50}$  alloy based on EDX.

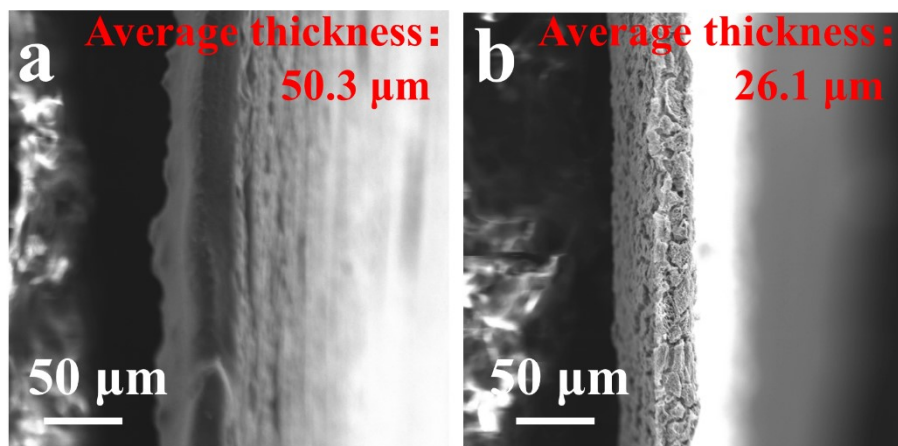


**Figure S6.** SEM images of (a,c,e) quenched and (b,d,f) free surfaces of the RS Al-Zn alloys: (a,b) Al<sub>96</sub>Zn<sub>4</sub>, (c,d) Al<sub>92</sub>Zn<sub>8</sub> and (e,f) Al<sub>85</sub>Zn<sub>15</sub>.

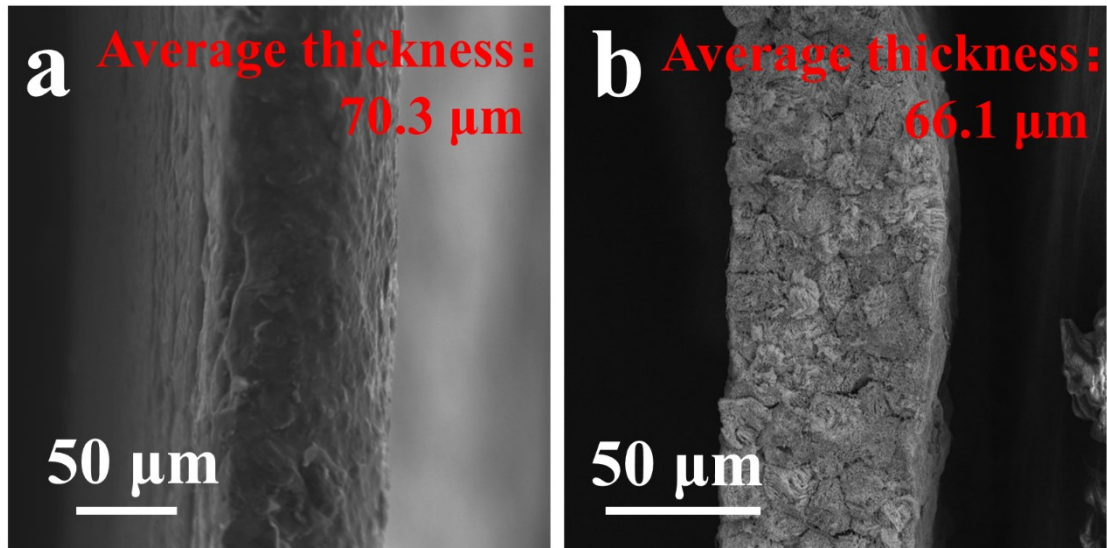


**Figure S7.** SEM images of (a,c,e) quenched and (b,d,f) free surfaces of the RS Al-Zn alloys: (a,b) Al<sub>70</sub>Zn<sub>30</sub>, (c,d) Al<sub>60</sub>Zn<sub>40</sub> and (e,f) Al<sub>50</sub>Zn<sub>50</sub>.

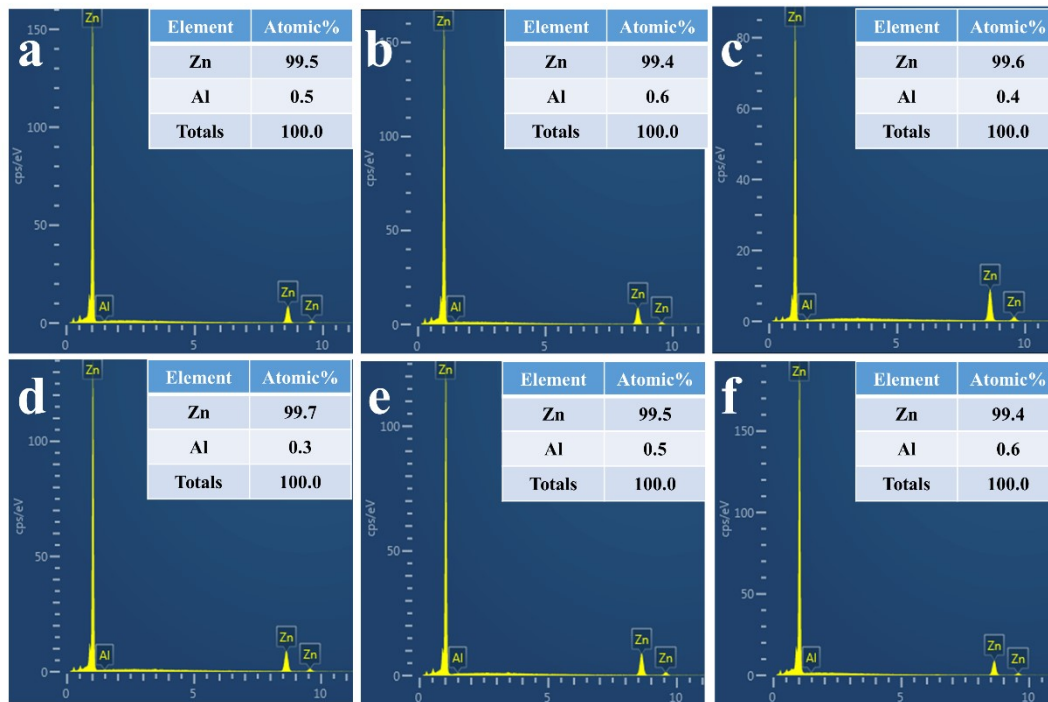




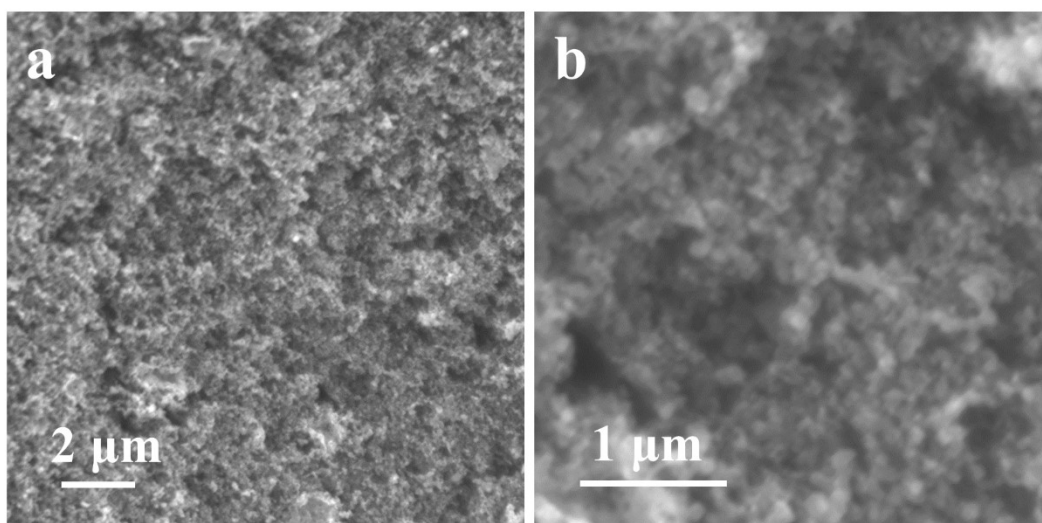
**Figure S8.** Cross-section view SEM images of (a) Al<sub>96</sub>Zn<sub>4</sub> alloy ribbon and (b) NP-Zn<sub>4</sub> ribbon.



**Figure S9.** Cross-section view SEM images of (a)  $\text{Al}_{85}\text{Zn}_{15}$  alloy ribbon and (b) NP- $\text{Zn}_{15}$  ribbon.



**Figure S10.** EDX spectra and compositions (insets) of the NP-Zn ribbons: (a) NP-Zn<sub>4</sub>, (b) NP-Zn<sub>8</sub>, (c) NP-Zn<sub>15</sub>, (d) NP-Zn<sub>30</sub>, (e) NP-Zn<sub>40</sub> and (f) NP-Zn<sub>50</sub>.



**Figure S11.** SEM images of the NP-Zn<sub>15</sub> electrode (a) before and (b) after 10 h electrolysis at -0.7 V vs. RHE.