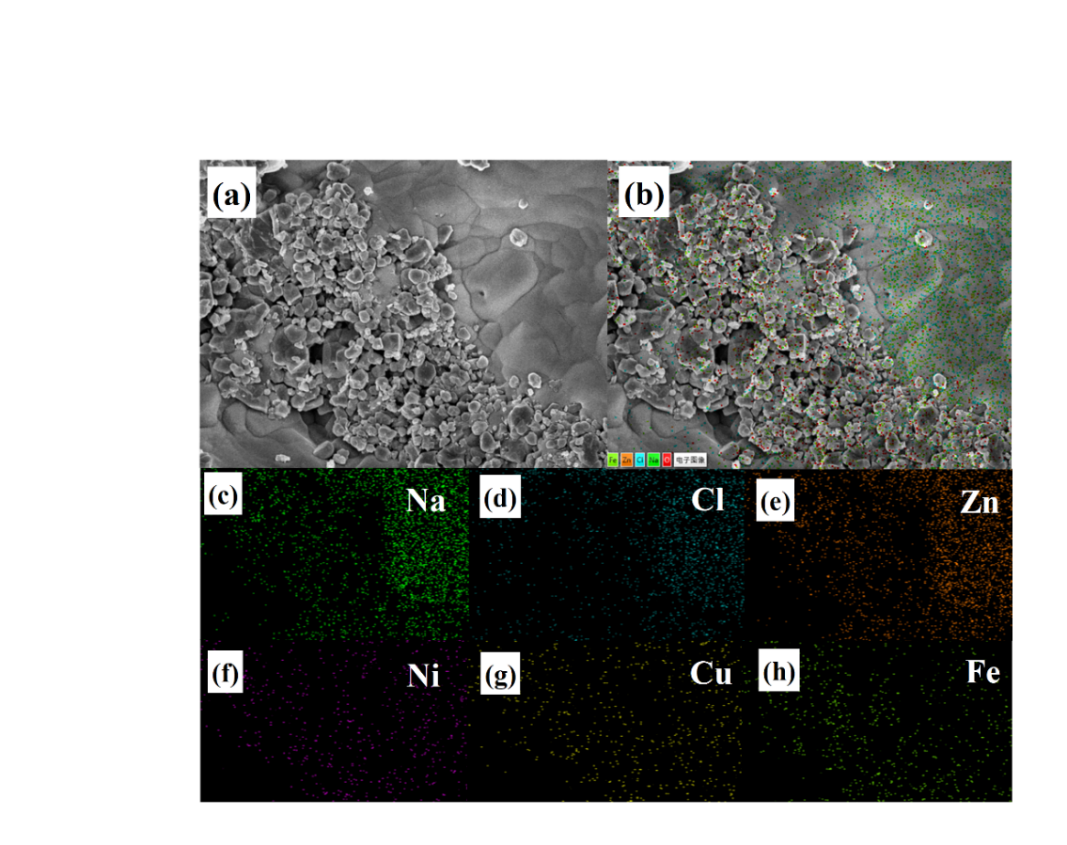
A close-up of several images of a sample

Description automatically generated

**Figure S1.** Sectional surface SEM diagram of multiphase ceramics xNaCl/(1-x)NZO (**a**) x=0.3; (**b**) x = 0.4; (**c**) x = 0.5; (**d**) x = 0.6.



**Figure S2.** (**a**) SEM diagram of 0.5NaCl/0.5NZO multiphase ceramics at 200 ℃/30min/500MPa; (**b**) EDS mapping；(**c**) Na；(**d**) Cl；(**e**) Zn；(**f**) Ni；(**g**) Cu；(**h**) Fe.

A graph of different colored lines

Description automatically generated

**Figure S3.** XRD pattern of different content of H3BO3.

A close-up of several small rocks

Description automatically generated

**Figure S4.** Sectional surface SEM figure of xH3BO3 /(0.8-x)Ni0.5 Zn0.5 Fe2O4/0.2 NaCl (a)x=0.1; (b)x=0.2; (c)x=0.3; (d)x=0.4.

**Table S1.** Dielectric loss of NaCl-NZO and HB-NZO-NaCl samples near some typical frequencies.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | | | | | |
| NaCl-NZO | 10MHz | 50MHz | 100MHz | 200MHz | 500MHz | 1000MHz |
| **0.3NaCl** | 0.1395 | 0.0734 | 0.05363 | 0.04149 | 0.02963 | 0.02068 |
| **0.4NaCl** | 0.1202 | 0.06622 | 0.05363 | 0.03865 | 0.02888 | 0.0322 |
| **0.5NaCl** | 0.0423 | 0.02814 | 0.02022 | 0.01624 | 0.00989 | 0.00027 |
| **0.6NaCl** | 0.016 | 0.01389 | 0.01004 | 0.00825 | 0.00295 | 0.00038 |
| HB-NZO-NaCl |  |  |  |  |  |  |
| **0.1HBO** | 0.16709 | 0.08543 | 0.06755 | 0.05255 | 0.04224 | 0.04995 |
| **0.2HBO** | 0.12741 | 0.0575 | 0.04316 | 0.0327 | 0.02703 | 0.03794 |
| **0.3HBO** | 0.03571 | 0.02084 | 0.01534 | 0.01269 | 0.01283 | 0.01825 |
| **0.4HBO** | 0.02597 | 0.01184 | 0.00534 | 0.00379 | 0.00287 | 0.00525 |

**Table S2.** Magnetic loss of NaCl-NZO and HB-NZO-NaCl samples near some typical frequencies.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | | | | | |
| NaCl-NZO | 10MHz | 50MHz | 100MHz | 200MHz | 500MHz | 1000MHz |
| **0.3NaCl** | 2.52×10-5 | 4.029×10-4 | 0.0013 | 0.00389 | 0.01574 | 0.04848 |
| **0.4NaCl** | 1.01×10-5 | 3.768×10-4 | 0.00127 | 0.00389 | 0.01554 | 0.04612 |
| **0.5NaCl** | 1.65×10-6 | 3.09×10-4 | 9.075×10-4 | 0.0031 | 0.0123 | 0.03669 |
| **0.6NaCl** | 2.22×10-5 | 2.4×10-4 | 8.1×10-4 | 0.00242 | 0.00927 | 0.02705 |
| HB-NZO-NaCl |  |  |  |  |  |  |
| **0.1HBO** | 2.53×10-5 | 4.03×10-4 | 0.0013 | 0.0039 | 0.01574 | 0.04995 |
| **0.2HBO** | 1.65×10-6 | 3.09×10-4 | 9.62×10-4 | 0.00313 | 0.0123 | 0.03794 |
| **0.3HBO** | 1.65×10-6 | 3.09×10-4 | 5.56×10-4 | 0.00313 | 0.01283 | 0.01825 |
| **0.4HBO** | 3.93×10-5 | 4.48×10-5 | 1.35×10-4 | 4.62×10-4 | 0.00206 | 0.00582 |