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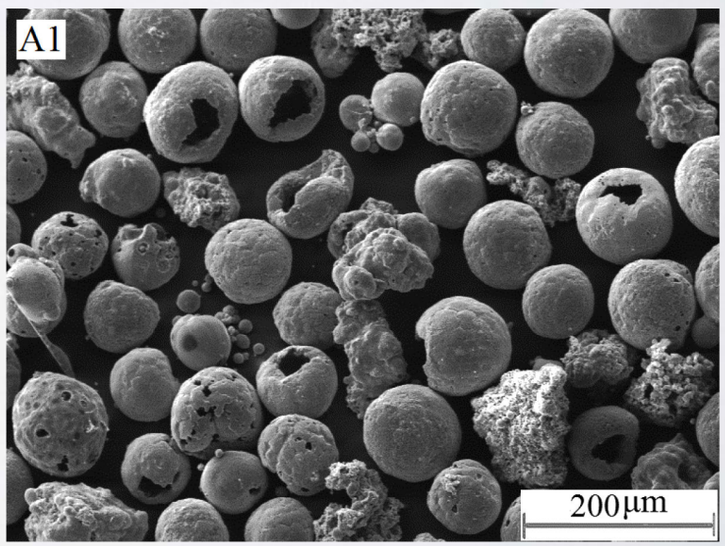
Effect of heat-treatment on LiZn ferrite hollow microspheres prepared by self-reactive quenching technology

Key words:

LiZn ferrites; Heat-treatment; Low frequency; Microwave absorption properties



Self-reactive quenching technology

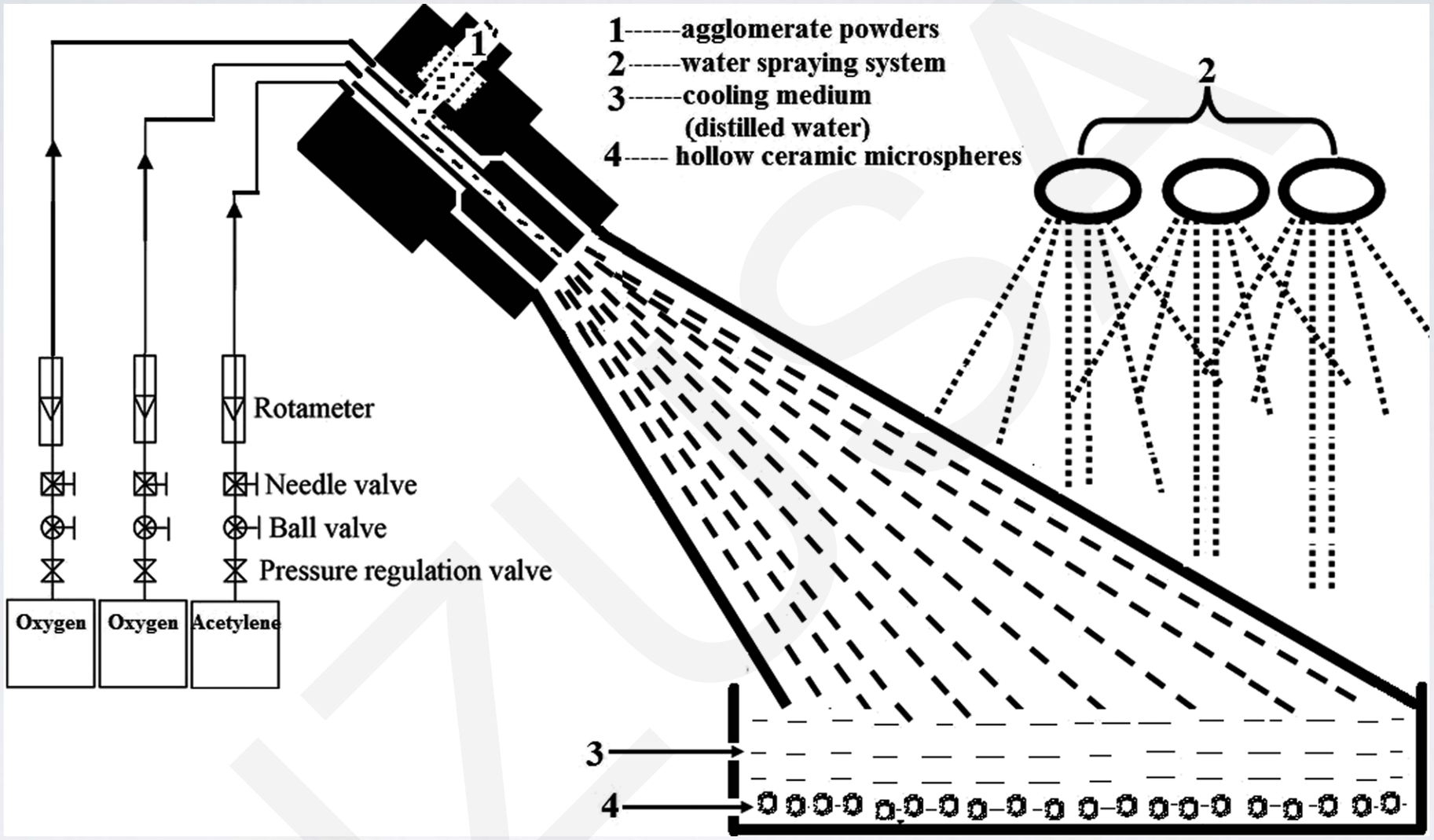


Fig. 1 Principle diagram for preparation of LiZn FHMs by self-reactive quenching technology

LiZn ferrite hollow microspheres

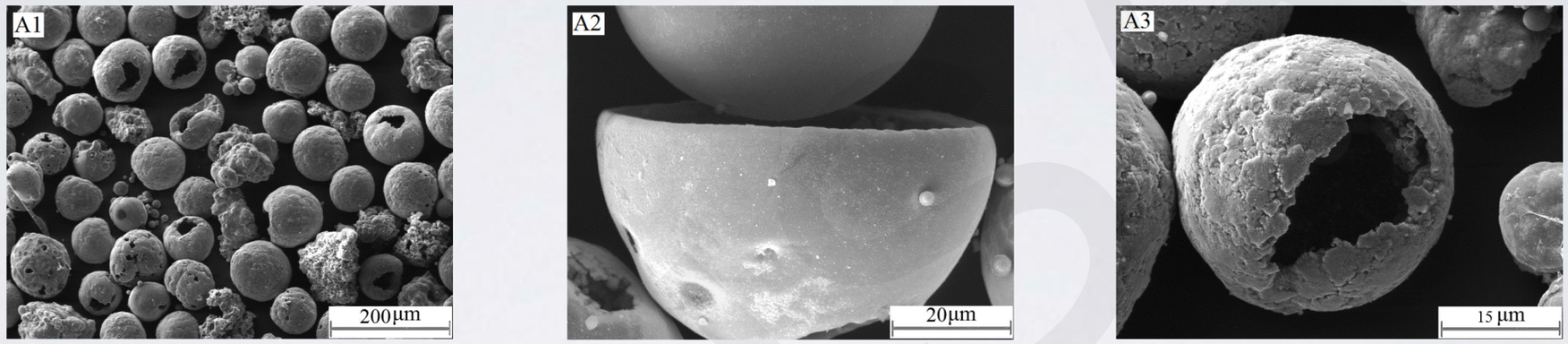


Fig. 2 SEM photographs of LiZn FHMs before (A1-A3) and after heat-treatment (B1-B3)

Microwave absorption properties

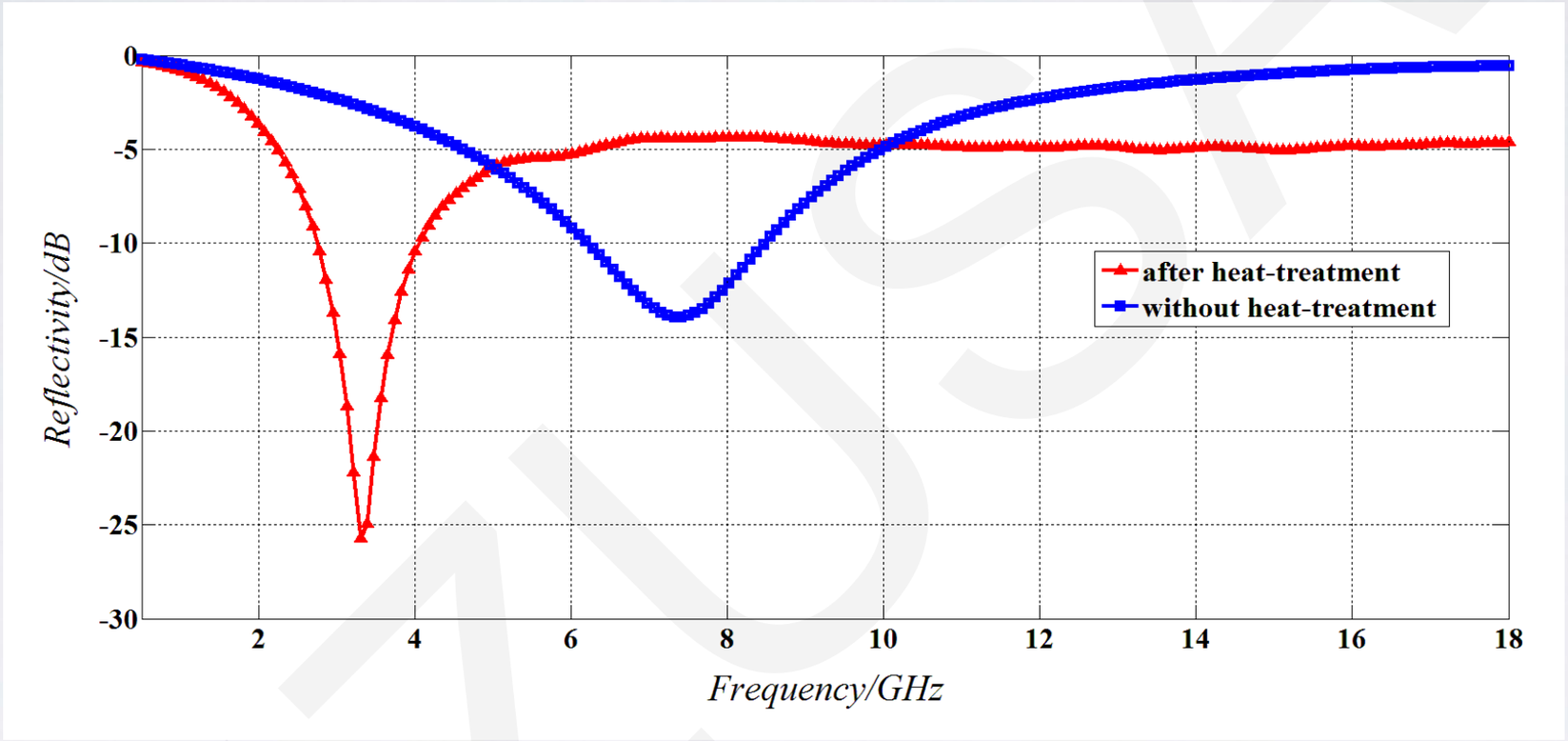


Fig. 3 Reflectivity of LiZn FHMs absorbent samples with the thickness of 3 mm before and after heat-treatment

Conclusions

1. LiZn FHMs are synthesized by self-reactive quenching technology based on a $Fe+Zn+Fe_2O_3+O_2+Li_2CO_3$ reactive system. Then the samples were calcined at 1200 ℃ for 4 h. The surface morphology, phase components, and microwave absorption properties before and after heat-treatment were studied.
2. The surface of LiZn FHMs is smooth and crystal growth is not obvious without heat-treatment. After heat-treatment, crystals on the surface of LiZn FHMs grow significantly. Multiple-shape micro-nano crystals containing triangular, polygonal and irregular crystals are generated. These crystals are distributed between 800 nm and 15 μm.
3. Four electromagnetic parameters of LiZn FHMs all increase, the microwave absorption properties are improved and the absorption peak transforms to a lower frequency range. The minimum reflectivity reaches -26.5 dB at 3.4 GHz and the effective frequency bandwidth is 1.4 GHz (2.6-4 GHz).
4. The appearance and growth of multiple-shape micro-nano crystals may be the main reasons for improvement of microwave absorption properties at low frequency after heat-treatment.