

Abstract Submitted
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Study on bulk nanostructured MnBi permanent magnet prepared by spark plasma sintering DONGTAO ZHANG, SUAI CAO, MING YUE, WEIQIANG LIU, JIUXING ZHANG, YOU QIANG, NANOMATERIAL TEAM, NANOPHYSICS TEAM — In this paper, we report on the structure and magnetic properties of bulk nanostructured Mn_{100-x}Bi_x ($x = 40, 45,$ and 52) permanent magnets prepared by spark plasma sintering (SPS) technique. Effect of Mn/Bi ratio on the MnBi low temperature phase (LTP) formation and magnetic properties of the magnets was investigated. Increase of bismuth amount in the synthesized magnets leads to better formation of LTP, resulting in the improvement of both magnetization (at 2 Tesla) and remanence, but reducing the coercivity of the magnets. M_s increases from 27.87 emu/g for Mn₆₀Bi₄₀ to 45.31 emu/g for Mn₄₈Bi₅₂, while the coercivity decreases from 10.5 kOe to 7.87 kOe at room temperature. For the Mn₄₈Bi₅₂ magnet, TEM observation shows that its microstructure is composed of fine and uniform grains with an average size of 140 nm. The density of the magnet is 8.7g/cm³, which is over 93% of its theoretical density. Further magnetic measurement at 423 K shows that the Mn₆₀Bi₄₀ magnet possesses a high coercivity of 19 kOe, indicating a strong positive temperature coefficient of coercivity of the bulk nanostructured MnBi permanent magnets.

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