Direct production of hard magnetic ribbons with enhanced magnetic properties by controlling cooling rate of melt

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JOURNAL OF APPLIED PHYSICS
Volume: 117 Issue: 12
Article Number: 123905
DOI: 10.1063/1.4915280
Published: MAR 28 2015
View Journal Impact

Abstract
We produced a high-quality hard magnetic Fe81Co2Nb1Nd10B6 alloy by melt spinning without additional treatment. The as-spun ribbons produced at a wheel speed of similar to 25 m/s had the best hard magnetic properties: a remanence B_r, coercive force H_c, and maximum energy product (BH)_{max} of 0.97 T, 676 kA/m, and 140 kJ/m^3, respectively. The Nd2Fe14B/alpha-Fe nanocomposite phases had grain sizes of similar to 10-30 nm. We investigated how the magnetic properties changed with wheel speed, finding that they depended on the as-spun structure and magnetic structure, which changed upon over-and under-quenching from the melt. (C) 2015 AIP Publishing LLC.

Keywords
KeyWords Plus: NANOCOMPOSITE PERMANENT-MAGNETS; MICROSTRUCTURE; ANISOTROPY; PHASE

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Funding

<table>
<thead>
<tr>
<th>Funding Agency</th>
<th>Grant Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Natural Science Foundation of China</td>
<td>50871105 51301188</td>
</tr>
<tr>
<td>China Postdoctoral Science Foundation</td>
<td>2013M541804</td>
</tr>
</tbody>
</table>

View funding text

Publisher
AMER INST PHYSICS, 1305 WALT WHITMAN RD, STE 300, MELVILLE, NY 11747-4501 USA

Categories / Classification