Magnetic and structural properties of rare-earth free permanent magnets Fe-Ni-Al

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Permanent magnets [1-6] are used in an impressive range of applications, from electromotors and loudspeakers to windscreen wipers, locks, microphones and toy magnets, computer hard-disk drives, wind generators, and hybrid-car motors. The performance of RE-TM intermetallics is difficult to beat, but rare-earth supplies have become a bottleneck in recent years, and there is active research in various directions. First, as emphasized by Skomski and Coey [7], the range of transition metal-rich rare-earth intermetallics is limited, but improving the energy product could be possible by suitable nanostructuring [7-8]. Second, a fundamental topic is the improvement of permanent magnet materials, by changing chemical composition and atomic structure. Along with rare-earth systems, some Fe-based alloys are some of the most promising candidates for rare-earth compounds for the production of permanent magnets. In this work we report on the results of investigation of magnetic properties Fe-Ni-Al system after severe plastic deformation by high pressure torsion.

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This work is supported by 5 top 100 Russian Academic Excellence Project at the Immanuel Kant Baltic Federal University and the Russian Science Foundation project #19-72-00047.