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Direct synthesis of ordered L10 FePt nanoparticles in the gas phase JIAN-PING WANG, JIAO-MING QIU, JIANMIN BAI, MINT Center and Department of Electrical and Computer Engineering, University of Minnesota — Uniform $L1_0$ FePt nanoparticle is one of the candidates for future extremely high magnetic recording media. Chemical methods of fabricating FePt nanoparticles require post-annealing process that usually leads to particle agglomeration[1]. We have developed a controllable approach to fabricate ordered FePt nanoparticles with uniform size and free of particle agglomeration based on nanocluster deposition technique[2]. In the approach, FePt nanoparticles were generated through gas-phase aggregation using magnetron sputtering at high argon pressure. Differential pressure forces drove the particles flying through an on-line infrared heater where particles transform from disordered A1 phase into ordered $L1_0$ phase. Particle nucleation, growth and ordering happened at separated sequential stages in vacuum. FePt nanoparticle size can be controlled by adjusting various deposition parameters including sputtering power density, argon pressure, aggregation length, etc. Without further treatment, FePt nanoparticles with on-line heating showed high anisotropy that verified the direct deposition of the $L1_0$ phase particles. References:

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2. H. Haberland, M. Karrais, M. Mall, Y. Thurner, J. Vac. Sci. Technol. A **10**, 3266 (1992)

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