# CONDITIONS FOR DEVELOPMENT OF REGULAR STRUCTURE BY DEFORMATION OF METAL MATERIALS

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The initial structure state of metal semi-products predetermines their ability to deform with formation of usual for the given material crystallographic texture and connected with it strain hardening distribution. Authors showed by means of X-ray studies [1], that in all metal materials, subjected to plastic deformation and therefore, according to conventional concepts, having the developed texture, grains responding to texture maxima are least crushed and have the most perfect crystalline lattice, whereas grains, responding to texture minima, are most dispersed by greatest distortion of their lattice. This regularity bases on the following. Rotation of grains to stable orientations, where mutually symmetric slip systems operate, is possible only by big grains and perfect lattice, when grain boundaries and increased density of defects do not hinder operation of deformation mechanisms. Otherwise the deformed grain remains at periphery of texture maximum and raises hardening of material. Application of the X-ray method of generalized pole figures, combining texture measurement with successive registration of profiles for same X-ray line from all grains of sample, allows to connect the position of reflecting grains relatively to texture maxima with the state of their crystalline lattice, estimated by broadening of X-ray line profile. When the dynamical recrystallization develops in metal semi-product at earlier stages of technological treatment, this circumstance can impede systematic formation of texture by next cold deformation, since, according to Hall-Petch relationship, the slip is hindered in small grains, arising by dynamical recrystallization. The analogous situation realizes by static recrystallization by formation of the new fine-grained structure. But when the size of recrystallized grains increases by reduction of deformation degree or temperature of intermediate annealing, operation of deformation mechanisms becomes easier and final structure and properties of semi-product acquire described above regular character.

[1] Perlovich Yu., Bunge H.J., Isaenkova M., Textures & Microstructures, 1997, **29**, 241-266.