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An Extinction-Free Technique for Pole Density Measurements of Textures by XRD. I. Tomov, S. Vassilev. *Central Laboratory for Photographic Processes, Bulgarian Academy of Sciences, Sofia 1113, Bulgaria.*
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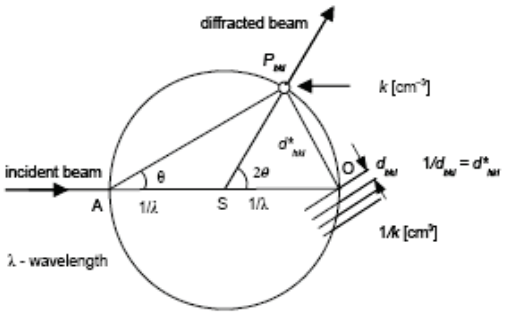
Characterisation of textural anisotropy is based on using pole density (texture factor) *P* that is a quantity normalized in multiples of random distribution of crystallographic orientations [1]. Determining *P* according to the well-known definition *P*=*Ikin*/*Ir* is affected by an extinction-induced systematic error in the measured intensity *Ir* of the powder standard. Here, *Ikin* is the kinematical intensity of the same reflection of the textured sample, which is corrected for SE [2]. The purpose of this study is to overcome the inherent deficit of accuracy in the above definition and to substantiate a radically novel definition based on the use of empirical extinction coefficient *k*. It is found that $k=2g\mu/PI0S$ depends on the secondary extinction coefficient *g*, the linear absorption coefficient μ, the intensity *I*0 of the incident X-ray beam and its cross section *S* [2]. The dimension of *k* is a reciprocal volume whose value is inversely dependent on the density *P* of the <*hkl*> poles of the crystal planes contributing to the node *Phkl* in the reciprocal space as shown in the figure (see [3]). The reciprocal volume corresponding to *k* is scanned during the measurement of the *hkl* reflection. According to the relationship between reciprocal and real space, the quantity 1/*k* corresponds to the real space and defines the volume of the crystallites contributing to reflection. In case of randomly orientated crystalline distribution, the pole density *Pr* is equal to unity. Then, the empirical coefficient *kr* is expressed by $kr=2g\mu/I0S$. By dividing the reciprocal quantities 1/*k* and 1/*kr* one obtains the expression *P*=*kr*/*k* for pole density measurements under extinction-free conditions. Whereas this treatment is a simple description of a novel technique, the single reflection method [2] is a proper tool for implementation of this technique for experimental determination of *k* and *kr* and, hence, *P*.



[1] Bunge, H. J., *Texture Analysis in Materials Science*. London, 1982: Butterworths. [2] Tomov I., *Z. Kristallog*. Suppl., 2007, 26, 131. [3] Taylor, A., *X-ray Metallography*, John Wiley, New York, 1960.

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