

Observation of size distributed multiwalled carbon nanotubes and titanate nanowires in planetary ball mill by transmission electron microscopy

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High-energy milling feasible chemical reactions are so fashionable nowadays and nanotechnology have been began to apply. That's why there was a demand for a model that allows to determinate grinding energies as precisely as possible, because this is the only way to interpret the correlations between the product's properties and the used technique parameters. Burgio et al. in 1990 [1] have proposed an equation, which includes the most of parameters of milling. Later Chattopadhyay et al [2] modified it thus the most precisely approximation they got.

With these a sample series has prepared to verify the accuracy of the model. Our goal was that, mills which are having different parameters, by this model the same product can be create. For this multi-walled carbon nanotubes and titanate nanowires were used. With this model a milling-map has created to follow up the changes of energies (ball-impact energie and cumulative energy) and the relationship between the average length and the structure of the product. From all sample transmission electron microscopic (TEM) images were taken. The average length of each sample was determined by these TEM images using Image-Java application.



- [1] Mechanical alloying of the Fe–Zr system. Correlation between input energy and products; Burgio, N., Iasonna, A., Magini, M., Martelli, S. and Padella, F. *Il nuovo cemento*, 1990, 13D(4), 459–476.
- [2] A mathematical analysis of milling mechanics in a planetary ball mill P.P. Chattopadhyay a, I. Mannaa, S. Talapatra b, S.K. Pabi a; *Materials Chemistry and Physics* 68 (2001) 85–94.