AU9918238

NITRIDATION OF SI USING MECHANO-FUSION METHOD

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It has been found that silicon nitride (Si_3N_4) can be formed by ball milling of Si in ammonia [1]. However only small fraction of Si can be transformed into Si_3N_4. The major milling effect is the formation of poly/nanocrystalline silicon. At this stage of research it is difficult to answer the question why ball milling causes only limited formation of Si_3N_4. It is due to little understanding of processes occurring during milling. Therefore, the purpose of this work was to study nitridation reaction during milling of Si in ammonia. In particular the effect of milling conditions such as milling energies, atmosphere and a form of starting material was studied.

The micro/macrostructural development during milling and subsequent annealing was studied using x-ray diffractometry, thermal analysis, elemental analysis measurement. It was found that the transformed fraction of Si_3N_4 compound is strongly dependent on milling energies and milling atmosphere.

Reference:

1. A.Calka, J.S.Williams and P.Millet, Scripta Metallurgica et Materialia **27**,185(1992)