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MAGNETIC NANOPARTICLES-POLYMER HYBRID MATERIALS

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Abstract: *The article discusses the results of scientific research on a new type of magnetically controlled materials, the properties of which change reversibly under the influence of a magnetic field. One of the properties of the material is the magnetorheological effect, the dependence of viscoelastic properties on the magnetic field. In fact, the material has a large set of different properties. A detailed study of the material revealed the presence of a combination of properties in it: magnetorheological effect, magneto-deformation effect, magnetostrictive effect, shape memory effect (pseudo-plasticity effect), magnetoresistive effect, and magneto- piezoresistive effect.*

Keywords: *magnetic field, magnetorheological effect, viscoelastic, magneto- deformation effect, magnetostrictive effect, shape memory effect, pseudo-plasticity effect, magnetoresistive effect, magneto-piezoresistive effect.*

INTRODUCTION

Research on magnetic nanocomposites (MNCs) is flourishing, allowing the development of new phenomena with potential applications across multiple disciplines and dimensions. Among the wide range of already discovered nanoscale materials used in various environmental and biomedical applications, magnetic nanoparticles (MNPs) are attracting increasing attention due to their inherent high magnetic properties [1,2]. These properties increase their success as magnetic. reducible catalysts, drug delivery agents, anticancer materials, nanoadsorbents, and magnetic resonance imaging (MRI) components. In addition, they can serve as building blocks in applications in areas such as biomedicine, information technology, MRI, catalysis, telecommunications, and environmental restoration [3 5]. This class of nanomaterials includes nanoscale materials such as metals.

Bimetallic nanoparticles, metal oxides, ferrites, and superparamagnetic iron oxide nanoparticles (SPION) [6, 7]. MNCs contain MNPs in a non-magnetic or magnetic matrix [8,9]. However, with regard to energy reduction coupled with the high surface area to volume ratio of nanosized particles, MNPs dispersed in composites tend to form agglomerates. To prevent this, new technologies have emerged to improve the stability of dispersions and the compatibility of primary MNPs by grafting or coating them with organic specialties such as surfactants or polymers. MNPs containing a polymer represent a new class of materials with improved characteristics compared to analogues.

DISCUSSION AND RESULT

There are four main types of MNCs: inorganic core-shell nanocomposites, self-assembling nanocomposites, silica-based MNCs, and organic inorganic nanocomposites. Particular attention is paid to organic-inorganic TNCs. Due to the combination of properties like organic and inorganic in one nanocomposite. This type of MNP includes a bright and wide variety of materials and combinations prepared by different methods and technologies.

Synthesis of magnetic nanoparticles the synthesis of MNPs of various compositions and phase compositions attracted the attention of researchers. It attracts attention due to the obtained excellent physical and chemical properties. A large number of works have been reported on nanosized iron oxides Fe3O4 and α-Fe2O3, which have the potential for superparamagnetic properties.

Moreover, because of the large surface-to-volume ratio, there is great interest in pure metals such as Fe and Co; spinel ferrites such as MgFe2O4, MnFe2O4, CoFe2O4 and NiFe2O4; ZnFe2O4 alloys, i.e. CoPt3 and FePt; VHI; as well as polymer magnets. The special position of MNPs is fundamentally due to their excellent properties, including chemical composition, type and degree of defectiveness of the crystal lattice, particle size and shape, morphology, interaction of the particle with the surrounding matrix, and particle proximity.

For these reasons, it is important to develop methods and ways by which the size, shape and chemical uniformity of magnetic particles can be controlled. More recently, 143 hybrid materials based on magnetic nanoparticles and polymers.

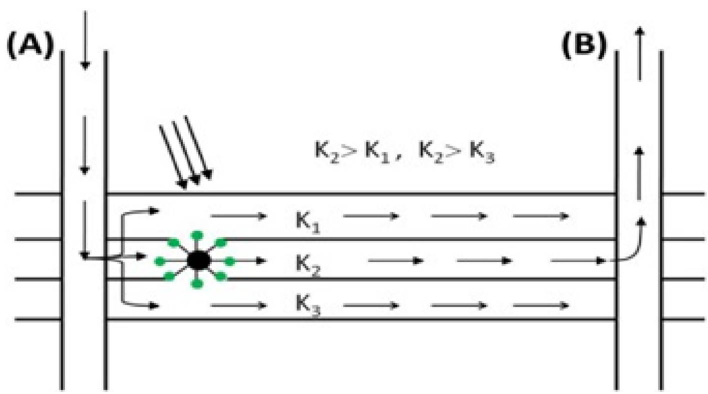

Figure 1.1 *Directional flood profile control is designed to determine the immigration ability of magnetic polymer nanospheres in a high temperature tank K1 represents average permeability, K2 is the pipe with the highest permeability, and K3 - low permeability. Three sand-filled tubes stand in parallel (30 cm long) with one entrance. (A) And exit (B). Magnetic polymer nanospheres were introduced at the inlet (A) and flowed through three parallel sand-filled tubes.*

Sol-gel processing was a very important development providing a new approach in chemistry to adapt new materials. It is an effective technology that has brought a new perception in the field of glass and ceramics. This is a sophisticated technology that can change the surface of the substrate and take advantage of obtaining the highest surface area and stability. This wet chemistry based treatment is very efficient in synthesis. Determination of the size of purified, stoichiometric and monodispersed oxide nanoparticles containing metal oxide, especially iron oxide nanoparticles. In terms of chemical reaction control, the homogeneous nanocomposites that are produced, in particular, form mixed oxides. The reaction starts with solutions of molecular precursors, metal or metalloid, surrounded by various reactive ligands, which undergo slow hydrolysis or polycondensation reaction and obtain colloidal sols [63]. The sol slowly develops fungi, and forms a web containing a liquid phase, the so-called gel. The sol-gel method has been widely used for the synthesis of MNPs and countless studies have been published. We have developed a new sol-gel for the fabrication of reusable one-dimensional Fe3O4 fibers with sufficient saturation magnetization, uniformly distributed MNPs in the fibers, and excellent flexibility. These fibers have the same advantages as particles, including a high surface area to volume ratio. In addition, they are easily recycled and reused, provide self-sufficiency, and do not tend to agglomerate in water.

CONCLUSION

The essence of the synthesis was the growth of Fe3O4 into precursor fibers by spontaneous nucleation during heat treatment. Previously, MNPs were embedded, the saturation magnetization of the fibers was low, and the distribution of MNPs was uneven.

The Fe3O4 nanofibers produced by this method had excellent crystallinity, uniform crystal grain size, uniform fiber morphology, high saturation magnetization, and flexibility. In addition, the adsorption and regeneration performance of toxic heavy metal Pb, and the separation efficiency of Fe3O4 fibers were better than those of similarly manufactured Fe3O4 powder.

REFERENCES

1. Khakimovich R. A., Dusmuratovich N. S., Ravshanbek o'gli J. R. DEVELOPMENT OF THERMAL TREATMENT WITH DOUBLE–PHASE RECRYSTALLIZATION OF THE COMPOSITE OF HIGH–CUTTING STEEL P6M5 WITH CONSTRUCTION STEEL 35ГЛ //CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES. – 2021. – Т. 2. – №. 5. – С. 101-107.
2. Жалилов Р. Р. Ў., Абдуғаниева Х. Р. Қ. ИССЛЕДОВАНИЕ МОРФОЛОГИИ И РАЗМЕРОВ УЛЬТРАДИСПЕРСНЫХ ПОРОШКОВ ВОЛЬФРАМА КРИСТАЛЛООПТИЧЕСКИМИ МЕТОДАМИ //Academicresearch in educational sciences. – 2021. – Т. 2. – №. 11. – С. 633-640.
3. Tojiboyev, B. M., Muhiddinov, N. Z., Karimov, R. I., & Jalilov, R. R. O. G. L. (2021). IKKILAMCHI TERMOPLAST POLIMERLAR ASOSIDA QURILISH SANOATI UCHUN POLIMERKERAMIK KOMPOZITSION MATERIALLARNI OLISH JARAYONINI TAKOMILLASHTIRISH. *Oriental renaissance: Innovative, educational, natural and social sciences*, *1*(9), 386-392.
4. Muxammadamin o'g'li M. A., Anvar o'g'li K. S. THERMOLECTRIC, RESISTANCE, PHOTO ELECTRIC DETECTORS AND ANALYSIS OF SPECTRAL CHARACTERISTICS OF MATERIALS IN THEM //Web of Scientist: International Scientific Research Journal. – 2021. – Т. 2. – №. 12. – С. 172-180.
5. Muxammadamin o'g'li M. A., Anvar o'g'li K. S. Production of micro-andnanoscale silicon granules using powder technology //Texas Journal of Multidisciplinary Studies. – 2022. – Т. 5. – С. 175-179.
6. Muxammadamin o'g'li M. A., Umidjon Turg'unboy o'gli X. Determine the amount of heat accumulated at the focal point of the solar oven //Texas Journal of Multidisciplinary Studies. – 2022. – Т. 5. – С. 161-164.
7. Umarova M. N., To'ychiev A. T. STRUCTURAL CLASSIFICATION AND ANALYSIS OF CORROSION OF METALS //Theoretical & Applied Science. – 2020. – №. 12. – С. 330-334.
8. Atakhanova S. K. et al. IMPROVING THE WEAR RESISTANCE OF MINING EXCAVATOR //Web of Scientist: International Scientific Research Journal. – 2021. – Т. 2. – №. 05. – С. 417-421.
9. Тожибоев Б. М. ВОПРОСЫ УЛУЧШЕНИЯ ПРОЧНОСТНЫХ СВОЙСТВ ПОЛИМЕРНЫХ КОМПОЗИЦИОННЫХ ПОКРЫТИЙ //Universum: технические науки. – 2021. – №. 12-2 (93). – С. 22-23.
10. Дадаханов Н. К., Каримов Р. И. МЕТОДЫ ВОССТАНОВЛЕНИЯ ШЕЙКИ ВАЛОВ С ПОМОЩЬЮ СВАРКИ //Universum: технические науки. – 2022. – №. 1-1 (94). – С. 29-33.
11. Дадаханов Н. К., Каримов Р. И. УСОВЕРШЕНСТВОВАНИЕ КОНСТРУКЦИИ РИФЛЕННОЙ ЦИЛИНДРА //Universum: технические науки. – 2021. – №. 2-2 (83).