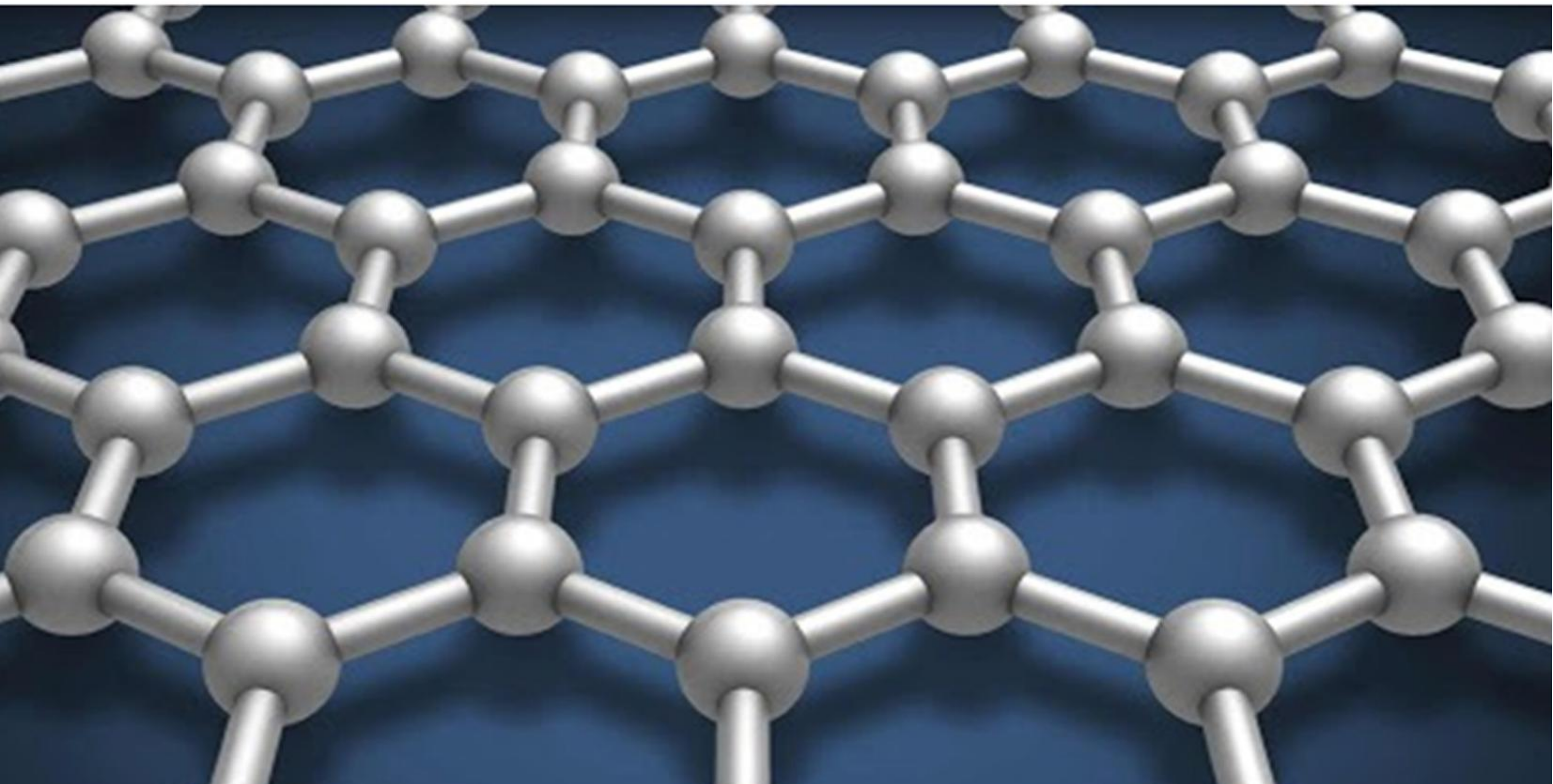
ISSN 2091-5527
№ 4/2025

O‘zbekiston

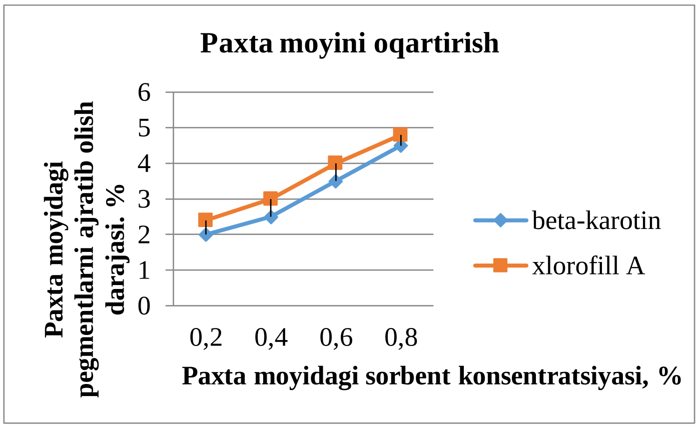
Kompozitsion Materiallar

Ilmiy-texnikaviy va amaliy jurnali



Узбекский научно-технический и производственный журнал

Композиционные материалы



1-rasm. Moydagi protonlangan sorbent konsentratsiyasiga xlorofill A va beta-karotinni ajratib olish darajasining o‘zgarishiga bog‘liqligi

Moydan xlorofill A ni ajratib olish darajasini oshirish uchun protonlangan gilga 1 (mass. %) sirti izoelektrik nuqtadan pastda musbat zaryadlangan alyuminiy gidroksid (IEN alyuminiy gidroksid - 7; 9,2, 8,1-9,7. Protonlangan paligorskitga alyuminiy gidroksid qo‘shilganda musbat zaryadlangan adsorbentning umumiy yuzasi ortadi, bunda moy tarkibidan xlorofill A ni ajratib olish darajasi ortishi kerak. Rotatsion paligorskitni 1 (mass. %) alyuminiy gidroksidining moydagi adsorbent konsentratsiyasi 1 mass. % moy tarkibidan xlorofill A ni ajratib olish darajasini 91,15±2,1% gacha (mass. %) moydagi adsorbentning xuddi shunday konsentratsiyasida alyuminiy gidroksidi).

Adsorbent yuzasidagi musbat zaryadning kamayishi, aksincha, xlorofill A ni ajratib olish darajasining pasayishiga olib kelishi kerak. Adsorbent yuzasidagi musbat zaryadning kamayishiga sovunning moydagi massa ulushini oshirish orqali erishildi. Moy tarkibidagi sovunning massa ulushi ortishi bilan protonlangan paligorskit bilan xlorofill A ni ajratib olish darajasi 1 mass. % alyuminiy gidroksid, kamayadi Shunday qilib, olingan ma’lumotlar shuni ko‘rsatadiki, adsorbent yuzasining musbat zaryadi kamayishi bilan xlorofill A ning moydan ajralish darajasi kamayadi.

Xulosa. Olingan eksperimental ma’lumotlarni umumlashtirish va tahlil qilish asosida shuni xulosa qilish mumkinki, protonlangan paligorskit 1 (mass. %) alyuminiy gidroksidni paxta moyini samarali oqartirish uchun ishlatish maqsadga muvofiqdir. Bu xorijdan keltirilayotgan qimmatbaho bentonitli oqlovchi sorbentlarni arzon mahalliy xomashyo – paligorskitli gil asosidagi oqlovchi kukunlarga almashtirish imkonini beradi.

FOYDALANILGAN ADABIYOTLAR

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THE EFFECT OF THE ADDITION OF SILICON AND MANGANESE ON THE PROPERTIES OF ALUMINUM-MAGNESIUM ALLOY: AN OVERVIEW FOR A COMPARATIVE ANALYSIS

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Introduction. Machinery construction, engineering, medicine, automotive and other industries are almost impossible to imagine today without aluminum alloys. Due to their corrosion resistance, good strength, low density, high recyclability, and most importantly, low cost, these alloys are gaining momentum in development and offer new opportunities for mechanical engineers, physicians, and other scientific researchers. Al alloys have different types of classifications that have their own strengths and weaknesses. However, aluminum-magnesium alloys are well known among them due to their high strength [1], ductility [2], ability to strain hardening and high corrosion resistance [3-5]. That is why these alloys are widely used in industries where light alloys are required.

Effect of Si on the properties of Al-Mg alloys. Silicon is well-known alloying element for its ability to improve the corrosion resistance and fluidity behavior of aluminum alloys [6][7]. Different studies have been carried out to better understand the change in the behavior of the different alloys, such as Al-Mg, Mg-Al alloys. In a study conducted by Vipin Kumar and other researchers from India, four different silicon additives were compared, namely 1.5%, 3%, 4.5% and 6%. The tensile strength analysis showed that the tensile strength increased with each addition of silicon and reached 148.99MPa, which is 23.26% higher than with the addition of 1.5% silicon (120.87MPa) [8].

The hardening effect was observed much earlier with a lower Mg/Si ratio than those with a higher magnesium/silicon ratio (210 MPa and 180 MPa for 0.49 and 0.39% silicon) [9]. However, in another scientific paper, it was noted that reducing the difference between magnesium and silicon can also contribute to a decrease in Mg2Si particles and an increase in the amount of pure silicon particles during the aging process. These particles, as follows, are known to reduce the ductility of the alloy. Therefore, scientists have come to a new statement that allows them to maintain plasticity while increasing the strength of the alloy. They proved that Fe helps to reduce such Mg2Si particles and increase the ductility of the alloy. In this paper, it was also stated that a higher difference in the Mg:Si ratio makes it possible to improve the ductility of the alloy.

Similarly, a group of scientists from Norway studying the effect of four alloying elements (magnesium, silicon, manganese and copper) on the microstructure and plasticity of aluminum-magnesium alloys, found the deterrent effect of silicon of the four elements on the ductility of the alloy. The best properties were obtained by combining the addition of silicon with the direct addition of manganese and copper. It was also noted that manganese significantly improves the ductility of the alloy due to its ability to prevent recrystallization of the alloy and reduce the average size of the main particles.

Effect of Mn on the properties of the alloys. Mofarrehi M., Javidani M. and Chen suggested that the alloy with a content of Mn has high strength and can affect hot workability and heating processes. They examined the manganese content in the range from 0.1% to 1% (0.1%, 0.4%, 0.7% and 1%), which helped them to better understand the behavior of the alloy when adding this element. The test temperature was set in the range of 350-500 degrees. It was found that the addition of manganese in an amount of 1% leads to the formation of dispersed particles at the grain boundaries of the alloys. This promotes dispersion and tensile hardening, as well as increases the mechanical strength of the alloys. The maximum yield stress changed from 131 MPa to 137 MPa, however, the effect of manganese on alloys mainly depended on the deformation conditions, since at low temperatures the change in properties was insignificant.

Also, manganese was found to have a better dispersion hardening effect than other elements. Beijing University of Science and Technology and Nanjing Technical University in China have developed a study on the effects of manganese and zinc on the properties of aluminum-magnesium alloys (Al-Mg-Sr-Zr). The scientists examined the results of the study by adding Mn and Zn, as well as the effect of the combined addition of zinc and manganese. During the study, using a scanning electron microscope, it was found that the addition of manganese leads to increased resistance to recrystallization and grain grinding, and has a strengthening effect. Four different samples were analyzed: a base alloy, an alloy with the addition of Mn, an alloy with the addition of Zn, and an alloy with the combined addition of both Zn and Mn. This study shows that the addition of these modifiers generally has a positive effect on increasing variance. When comparing the two additives, it was found that the best result in terms of dispersion hardening was obtained with the addition of Mn (160 MPa) compared with the addition of Zn (139 MPa). The Mn and Zn content thus leads to an increase in density to 144 MPa, 160 MPa, 139 MPa and 156 MPa for Al-Mg alloy, Al-Mg with the addition of Mn, alloy with the addition of Zn, and the alloy with combined additions of Mn and Zn.

Moreover, Junwei Fu and Kai Cui, in their study, showed that the percentage of Mn in Al alloys affects not only the mechanical properties of alloys, but also the reaction rate of the alloy to hardening. They found that increasing the amount of manganese helps to increase the corrosion resistance of alloys, as well as accelerates the hardening effect. The experiment samples included the alloys with three different content of Mn – 0.6, 0.9 and 1.2%. the paper states that the addition of Mn in the amount of 1.2% have the best hardening effect at the aging temperature of 180˚C (135HB after 2h), while 0.6% and 0.9% Mn additives have lower hardness (127HB after 4h and 132HB after 3h respectively). It was also added that a higher Mn content (1.2%) decreases the corrosion rate of the alloy – 0.076 and 0.012 (mm·y-1) for as cast and peak aged alloys.

A comparative analysis. Manganese and silicon are great additives for enhancement the mechanical and casting properties of alloys. If silicon has an effect on fluidity, tensile strength, lattice distortion and other characteristics, then manganese are mostly used to improve the

6. Проблемные обзоры