The wettability of the bare alloy and HA coating deposited on Mg alloy was monitored. It was revealed that after only 15 min of water droplet spreading over the surface a significant decrease in the water contact angle (from 100° to 66°) was observed. A significantly higher water spreading rate was observed in the case of bare alloy compared with that of the HA coated samples. The observed changes in the surface wettability over time indicated a strong time-dependent tendency to turn initially hydrophobic behavior to hydrophilic.

In this study, fabrication process and the properties of the HA coating deposited onto AZ91D magnesium alloys via RF-magnetron sputtering are described. Surface morphology and structure results suggested that the coating is crystalline HA with the uniform, homogeneous, and dense structure. Investigations did not reveal improvement of the surface wettability of the HA coated samples compared to the bare alloy, however water contact angle dynamics in the case of the HA coated substrates revealed a lower rate of a droplet spreading over the surface. The initially hydrophobic surface of the HA coating tend to be more hydrophilic with time.

REFERENCES

1. Zheng Y.F., Gu X.N., and Witte F. Biodegradable metals

ELECTROIONITE PROCESSES IN TWO-PHASE EXCHANGE SYSTEMS

L.I. Dorofeyeva, D.V. Orekhov
National Research Tomsk Polytechnic University,
Russia, Tomsk, Lenina Avenue, 30, 634050
E-mail: sisrabol@ya.ru

Separation by ion-exchange of isotopes and ions mixture used in processes of purification and selective extraction of valuable components from solution for the enterprises of the nuclear industry is actuals. Application of the given processes for exchange systems with electroregeneration of ion-exchange material used on sorption stages we considered.

Separation process efficiency depends on type ionite, its charge and the sizes, structural characteristics, the sizes in hydrated and dehydrated conditions [1], environment temperature and the nature anions, connected with cation in a solution. We had considered two-phase exchange systems with use organic and inorganic [2] cations.

The evident influence on conditions of ion-exchange sorption and ions with close properties separation is provided by means of the organic solvents additive to aqueous solutions of salts. The increase in separation factors of alkaline metals ions in aqueous-propanol solutions is connected with their dependence on solvation energy and a dielectric constant for equilibrium ions and increase of solvation energy at transition from aqueous to aqueous-alcoholic [3] solutions.

Collation of the received values shows, that on cation-exchange resin KU-2 the separation factors are higher than on carboxyl resin CB-4P×2. It explains that cation-exchange resin KU-2 from aqueous-propanol solutions mainly absorbs water as more polar component, and, hence, viscosity of environment inside of grain ionite is less while in cationite CB-4P×2 at swelling the quantity the propanol not much more decreases in comparison with an external solution and viscosity of environment inside of grain ionite above that directly influences conditions exchange sorption. Besides fixed carboxyl groups are less dissociated, than strong-acid a sulfate group, that also influences efficiency of ionic exchange.

Velocity of moving of concentration front [4] on length spaces between membranes the electrodialyzer was determined. At the attitude of mobility of isotopes 1,01 (isotopes of easy alkaline elements) speed of movement of a zone [5] makes 4…8 sm/hr. Depending on current density, the interval 150-300 мА/см^2 is optimum.

REFERENCES

1. Guide physical-chemical values. St. Petersburg: Special literature, 1999. – 232 p.
2. Jaroslavzev A.B. Ion exchange on inorganic sorbents // Progress of Chemistry. – 1997– т. 66– №7– P. 641–660.
3. Ismailov N.A. Electrochemistry of solutions. Moscow: Chemistry, 1976. – 488 p.
4. Electroionite processes in two-phase exchange systems of inorganic ionite-solution / I.A. Tikhomirov, A.P. Vergun, L.I. Dorofeyeva. VINITI, 28.03.01, № 757 – B2001.
5. Vergun A.P., Dorofeyeva L.I., Vergasov K. A. Electroregeneration ion-exchanger at isotope separation in exchange counterflow columns. // Materials All-Russia scientific and technical conf., in 5 - Krasnoyarsk, 1999. - P. 190-191.

ANNIHILATION OF ELECTRON

Y.V. Petrakov, L.E. Fedotov

National Research Tomsk Polytechnic University,

Russia, Tomsk, Lenina avenue, 30, 634050

E-mail: alexeypekar@mail.ru

In 1932 A. Anderson discovered the first antiparticle - positron (e +) - a particle with a mass of an electron but with a positive electric charge. The existence of e + follows directly from the relativistic theory of the electron developed by Dirac (1928-31) before the discovery of the positron. In 1936 while studying cosmic rays American physicists K. Anderson and S.Neddermeyer found muons (having both signs of electric charge) - particles with a mass of about 200 electrons, but otherwise with remarkably similar to the e-, e + properties.

Positrons (positive electrons) in the matter cannot exist because they are annihilated when decelerating, connected to the negative electrons. In this process, which can be seen as the reverse process of pair production, the positive and negative electrons disappear, while the photons transfer their energy.

Annihilation of electron-positron pairs causes the emission of a γ-ray or few γ-rays. One-photon annihilation can occur only if the electron is associated with a third body (for instance, nucleus or electrons).

In the annihilation of electro-positron pair the laws of conservation of energy and momentum are observed. So, if the center of mass of the pair is fixed in the laboratory measurement system, both γ-quantums are emitted in opposite directions with the same energy k1c = k2c = m0c2 = 0.511 MeV. If the center of mass of the pair is movable, the angles between the directions of expansion of γ-rays will be different from 180 °, and the value is not equal to the energy of 0.511 MeV. Thus, the measurement of the angle θ or Doppler shift of the annihilation line ΔEγ allows to determine the momentum in e + e - pairs in the laboratory measurement system.

In case of 3γ-annihilation conservation laws do not give accurate result when calculating momentum and the energy γ-quantums. In the stationary state, all three γ-quantums are emitted in the same plane. Deviation angle scattering (at the agitated state) from this plane is approximately v / c. Unlike 2γ-annihilation γ-quantums arising from 3γ-annihilation have a continuous energy distribution from 0 to 0.511 MeV.

In 1934 to explain the spectra of some stellar nebulae I.H. Mokhorovichich postulated the possibility of bound states between the electron and positron. Associated two-particle system (e^+ e^-) was named "positronium" (Ps).

REFERENCES

1.Prokopiev, E. P., Timoshenkov S. P., Grapatin V. I., Myasishchev G. G., J. V. Funtikov, «Positron book»
2.Akhiezer A. I., M. P. Rekalo:"Biography of elementary particles." -K.: Naukova Dumka, 1983.