



CONFERENCE ABSTRACTS

International Student Conference

“Science and Progress”

DAAD



Санкт-Петербургский
государственный
университет



German-Russian
Interdisciplinary
Science Center

St. Petersburg – Peterhof
November, 10-12
2020

CONFERENCE ABSTRACTS

International Student Conference “Science and Progress” –
SPb.: SBORKA, 2020 – 254 p.p.

ISBN 978-5-85263-224-1

ISBN 978-5-85263-224-1



9 785852 63224 1

Electrokinetic characteristics of nickel-containing glasses in 1:1 and 2:1 charging electrolytes

Kuznetsova Anastasiia
a_kuznetsova95@mail.ru

Scientific supervisor: Prof. Dr. Ermakova L.E., Department of Colloid Chemistry, Institute of Chemistry, Saint-Petersburg State University

The problem of the modern technologies' progress puts forward the task of developing the scientific basis of direct synthesis of composite metamaterials with specified functional characteristics. Glassy materials are successfully used as matrices, which have such advantages as low cost, thermal, chemical and micro-biological resistance, transparency in the visible region, etc. In the present work, nickel-containing glasses (Ni-1 and Ni-2) were obtained by introducing nickel oxide into the batch during the melting of basic alkali borosilicate glass (8V). There was of interest to determine the effect of the modifying agent NiO on the parameters of the phase interface (electrophoretic mobility of particles, position of the isoelectric point, IEP) in solutions of 0.01 M indifferent NaCl electrolyte, as well as in the presence of specifically sorbed ions Ni^{2+} (NiCl_2).

According to the elemental analysis of Ni-1 and Ni-2 glasses, which was carried out on $10 \times 10 \times 1 \text{ mm}^3$ plates before contact with electrolyte solutions by energy dispersive X-ray spectroscopy (EDX), the composition (wt%) of the sample Ni-1 are: 56.21 O, 5.04 Na, 14.33 Si, 24.41 Ni; sample Ni-2 are: 63.40 O, 4.18 Na, 12.42 Si, 20.00 Ni.

Measurements of the electrophoretic mobility of glass particles, found by laser Doppler electrophoresis, were used to calculate the electrokinetic potential (ζ^S). The electrokinetic potential of glasses in NaCl solutions is positive in the acidic region, then at pH 2.1 (8V), pH 2.8 (Ni-1 and Ni-2) passes through the isoelectric point and becomes negative. In nickel chloride solutions, the position of the isoelectric point pH 2.8 (8V) pH 3.1 (Ni-1 and Ni-2) and the ζ - pH curves (at pH > 4) are located lower than in the sodium chloride solution. The observed shift of the IEL to the alkaline region during the transition from an indifferent electrolyte NaCl to an electrolyte containing specific ions Ni^{2+} is consistent with the theoretical concepts of the electric double layer arrangement. Thus, it can be seen that the modification of the matrix has a more significant effect on the electrokinetic characteristics in a NaCl solution than in a NiCl_2 solution.

Acknowledgments. The reported study was funded by RFBR according to the research project № 20-03-00544a. The studies were carried out using the equipment of the Interdisciplinary Resource Center in the direction "Nanotechnology". Glass samples were synthesized in the Institute of Silicate Chemistry of the Russian Academy of Sciences by I.N. Anfimova.