PROPERTIES OF INORGANIC-ORGANIC CLATHRATE OF COMPLEX HIERARCHICAL ARCHITECTURE

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The scientific interest in nanohybridized composite structures is due to the need for new functional-hybrid materials, which will satisfy modern industry requirements. A promising direction of their formation is, in particular, the combination of inorganic and organic substances. Therefore, the characteristics of the silica matrix MSM-41 with β-cyclodextrin (β-CD) and the organometallic compound ferrocene ($C_{10}H_{10}Fe$) encapsulated in its pores were investigated.The aim of this work was to obtain an encapsulate based on a dielectric porous matrix and a supramolecular hierarchical magnetosensitive guest component. Thus, the possibility of forming a magnetically bounded dielectric heterostructure was envisaged. Relevant research will contribute to the development of scientific foundations for the accumulation and storage of electrical energy at the quantum level, mainly involving electrons and their spins. Sensitivity to the magnetic field will provide the necessary functional hybridity.

Methods of investigation:

- ***Impedance spectroscopy***
- ***Thermostimulated discharge methods***

Figure 1. The formed sample of MCM-41< β-CD <$C_{10}H_{10}Fe$>>.

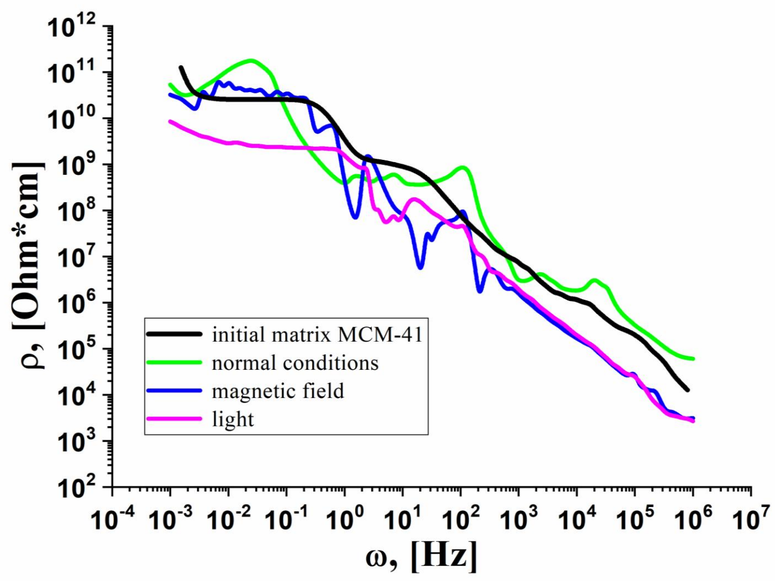


Figure 2. Frequency dependencies of the real term of the MCM-41< β-CD <$C_{10}H_{10}Fe$>> specific impedance, measured under normal conditions, in magnetic field and under illumination.

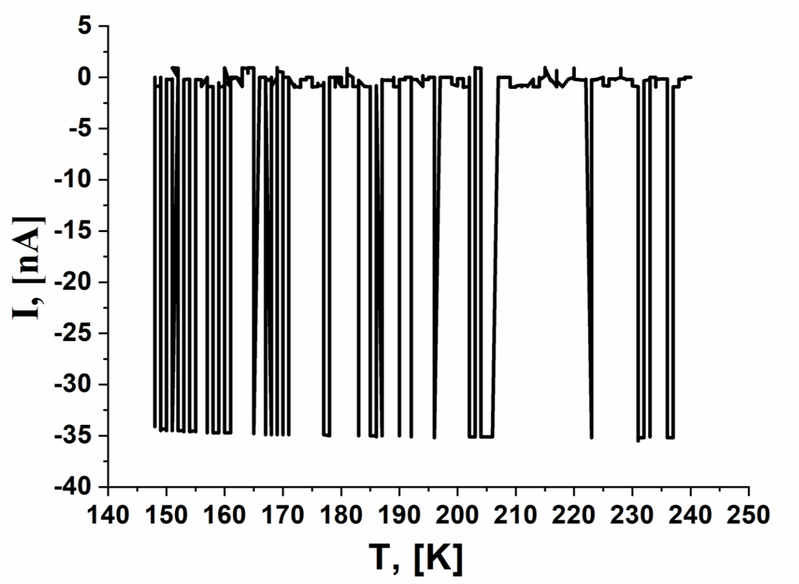


Figure 3. Spectra of thermostimulated discharge for MCM-41< β-CD <$C_{10}H_{10}Fe$>>.

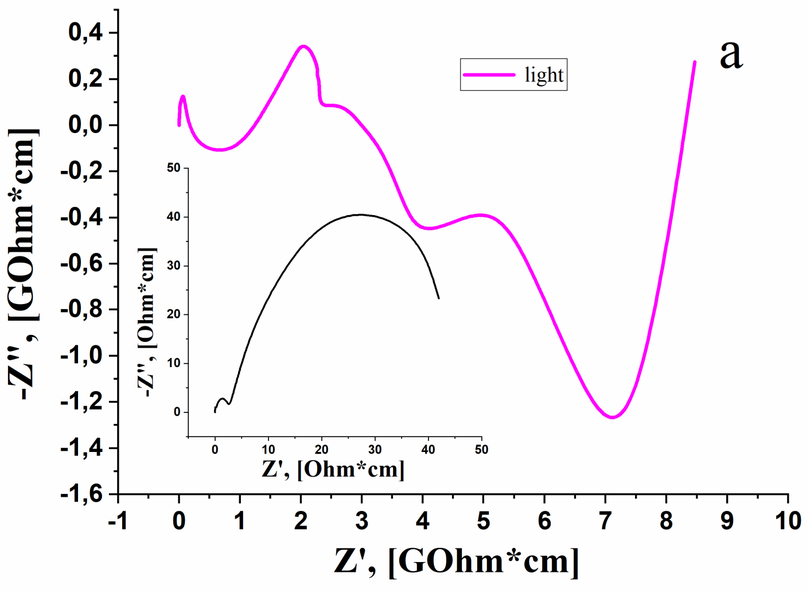
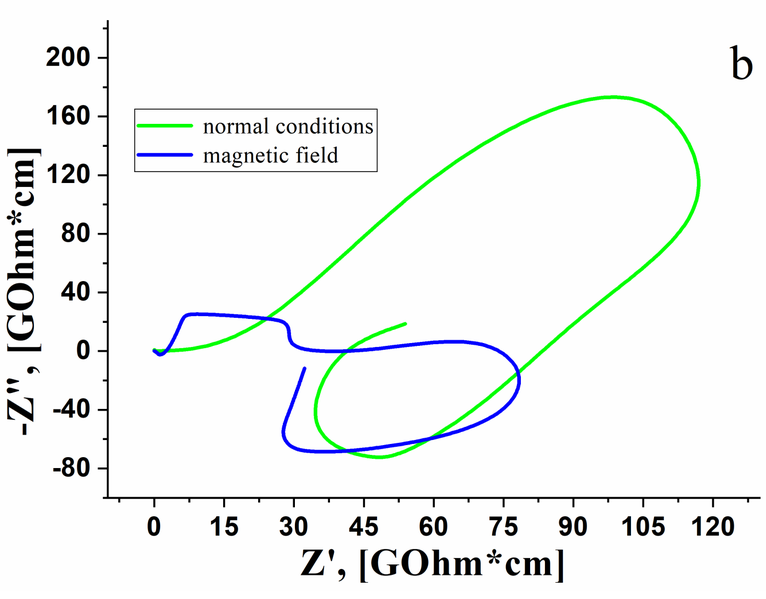


Figure 4. Nyquist`s diagrams of MCM-41< β-CD <$C_{10}H_{10}Fe$>>, measured under illumination (a), under normal conditions, in magnetic field (b). In the inset – Nyquist`s diagram of the matrix MCM-41.



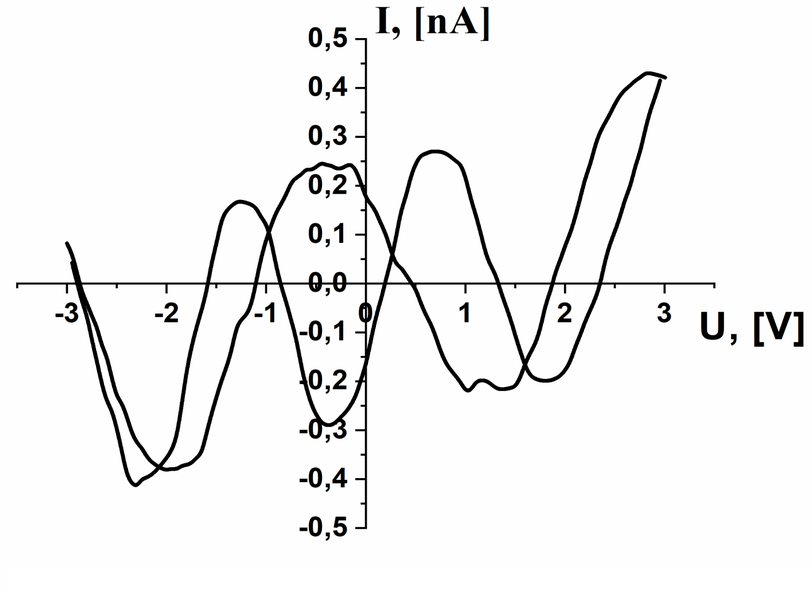


Figure 6. Volt-ampere characteristics of MCM-41< β-CD <$C_{10}H_{10}Fe$>>, measured in magnetic field.

CONCLUSIONS

1. **For the first time, the structure of MCM-41 <β-CD <$C_{10}H_{10}Fe$>> was formed by the method of thermal vacuum encapsulation and its research was carried out.**
2. **The intercalation of MCM-41 with β-CD<$C_{10}H_{10}Fe$>> leads to over 6 times increase in resistivity and changes in impedance response character which are more prominent under magnetic field applied and under illumination.**
3. **Volt-ampere characteristic of the obtained MSM-41<β-CD< $C_{10}H_{10}Fe$ >> clathrate indicates the ability to accumulate electrical energy combined with the memory effect in the magnetic field.**

REFERENCES

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