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IR-studies of thermally stimulated structural phase transformations in cryovacuum deposited films of Freon 134A

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The need to ensure the environmental safety of modern production requires the search for new technologies and working substances that cause minimal damage to the environment. An example of this is the use, as refrigerant, of Freon 134 or its isomer 134a, which replaces the environmentally problemous chlorofluorocarbon CF2Cl2. Refrigerant Freon 134 is increasingly used in domestic and industrial air conditioners, also in the aerospace industry. This circumstance requires more detailed information about its fundamental chemical and physical characteristics-thermodynamic properties, optical absorption spectra, etc., which can be directly used in solving a wide range of applied problems. And if these properties of Freon 134 in the gaseous phase was studied in sufficient detail, its thermophysical and optical characteristics in a condensed state at low temperatures have not been practically studied.

In this work, the objects of investigation are thin films of freon cryovacuum condensates condensed on a cooled metal mirror in a range of deposition temperatures from 16 to 100 K and pressures of the gas phase from 10^{-4} to 10^{-6} Torr. The thickness of the films was measured by a two-beam laser interferometer and amounted to d = 2.5 μm. At the same time, refractive index of the condensed samples was measured. IR absorption spectrum was measured in the frequency range of 400 cm^{-1} - 4200 cm^{-1}. In detail, the experimental setup and the measurement technique are described by us in earlier publications [1, 2].

REFERENCES

1. Drobyshev A., and others, Transformation of cryovacuum condensates of ethanol near the glass transition temperature, Low Temperature Physics. V.39, №8, 714-718 (2013).
2. Drobyshev A., and others, Physical modeling of the formation of clathrate hydrates of methane, Low Temperature Physics. V.41 №6, 552-558 (2015).