# THERMODYNAMICS OF PHASE TRANSITIONS OF METAL β-DIKETONATES AS A BASIS FOR CONTROLLING THEIR MASS TRANSFER IN MOCVD PROCESSES

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Volatile metal β-diketonates are widely used as MOCVD precursors in the production of various functional materials. Successful implementation of gas-phase processes requires reliable data on the saturated vapor pressure, enthalpies and entropies of sublimation or vaporization of these compounds, but the data available in the literature, as a rule, have a significant scatter [1, 2]. In this regard, we have developed a methodology for checking the reliability of thermodynamic data using the example of *tris*-β-diketonates of various metals [1-3], the essence of which is to establish the relationship between the composition and the corresponding properties in a series of isoligand chelates. The condition for its successful application is the availability of reliably determined standardized thermodynamic data for a series of complexes of one metal (the base series) and at least one compound of the tested series.

The next vector of development of the technique is the transition to β-diketonate complexes of metals of a different valence. In this work, we focused on copper(II) compounds, since, on the one hand, this is the most extensive series of complexes with existing literature thermodynamic data (more than 20 compounds), and on the other hand, they are synthetically and economically available, which makes them convenient objects of study. In addition, the extension of the method to heteroligand metal β-diketonate complexes is of particular interest. We selected magnesium *bis*-β-diketonates with tetramethylethylenediamine as the test series [4].

As a result of a systematic study, a standardized array of thermodynamic characteristics of copper(II) and magnesium(II) complexes was obtained, with the help of which we extended the technique to β-diketonate complexes of metals(II), and also demonstrated the possibility of its application to heteroligand compounds.

1. Makarenko A.M. et al. // Coatings. 2023. V. 13, № 3. P. 535.
2. Makarenko A.M. et al. // Coatings. 2023. V. 13, № 8. P. 1458.
3. Zherikova K.V. et al. // J. Therm. Anal. Calorim. 2022. V. 147. P. 14987.
4. Vikulova E.S. et al. // J. Therm. Anal. Calorim. 2019. V. 137. P. 923.