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## MATHEMATICAL MODELING OF THERMAL FADING OF ELECTRONIC F-COLOR CENTERS IN NaCl CRYSTALS WITH DIFFERENT Cd CONCENTRATIONS

*The aim of the article: to develop a mathematical model of thermal fading of electronic centers based on the experimental data obtained by the electronic thermal fading of electronic F -color centers in NaCl crystals with different Cd concentrations.*

*Key words: crystal, mathematical model, color center, electron, ion, polynomial.*

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## МАТЕМАТИЧЕСКОЕ МОДЕЛИРОВАНИЕ ТЕПЛОВОГО ОБРАБОТКИ ЭЛЕКТРОННЫХ Ф-ЦВЕТНЫЕ ЦЕНТРЫ В КРИСТАЛЛАХ NaCl С РАЗЛИЧНЫМИ КОНЦЕНТРАЦИЯМИ Cd

*В статье разработана математическую модель термического затухания электронных центров на основе экспериментальных данных, полученных электронным термическим затуханием электронных цветных центров в кристаллах NaCl с различными концентрациями Cd.*

*Ключевые слова: кристалл, математическая модель, центр окраски, электрон, ион, полином.*

The experimental and theoretical studies of the decay and transformation processes of the different in the structure radiation centers have proved that in the decay and interconversion process of radiation-induced defects at high temperatures is dominated by ion processes in the АНС [1].

A mathematical modeling of thermo luminescence in NaCl crystals with different silver concentrations was considered in the work [2]. A mathematical modeling of thermal fading of electronic  $Ag_a^-$ - color centers in NaCl crystals with different silver concentrations was considered in the work [3]. The work [4] considered a mathematical modeling of thermal fading of electronic  $Ag_c^{2+}$ - color centers in NaCl crystals with different silver concentrations.

In this paper we are making an attempt to of determination with the use of Newton's first interpolation formula of the initial and final function values and behavior of thermal fading of electronic F - color centers in NaCl crystals with different Cd concentrations.

If we take the experimental data for the nodal points then it is possible to analyze the decay behavior and interaction of electronic F- color centers close to the nodal points, using the up-to-date methods of interpolation.

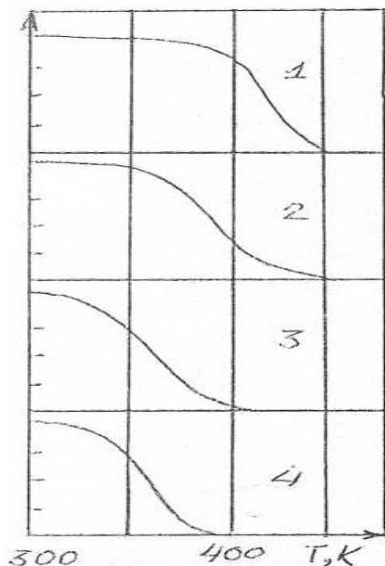
Considering J function of temperature and taking the temperature of the interpolation nodes, we interpolate the given J function table. As in this case the nodes are equally spaced, so we use the interpolated Newton polynomial as follows:

$$P_n(x) = y_0 + q\Delta y_0 + \frac{q(q-1)}{2!} \Delta^2 y_0 + \dots + \frac{q(q-1)\dots(q-n+1)}{n!} \Delta^n y_0 \quad (1)$$

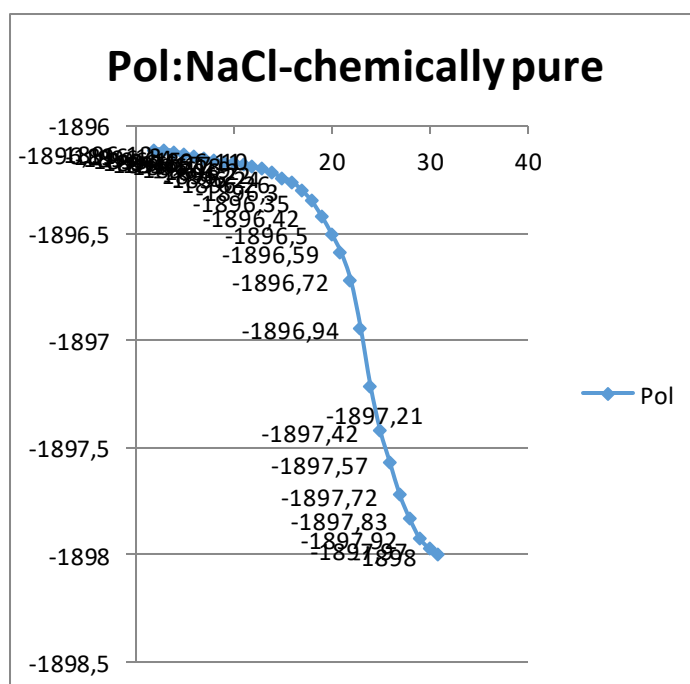
where,  $q = \frac{x - x_0}{h}$ ,  $x_i = x_0 + ih (i = 0, 1, 2, \dots, h)$   $\Delta^n y_i = \Delta^{n-1} y_{i+1}$

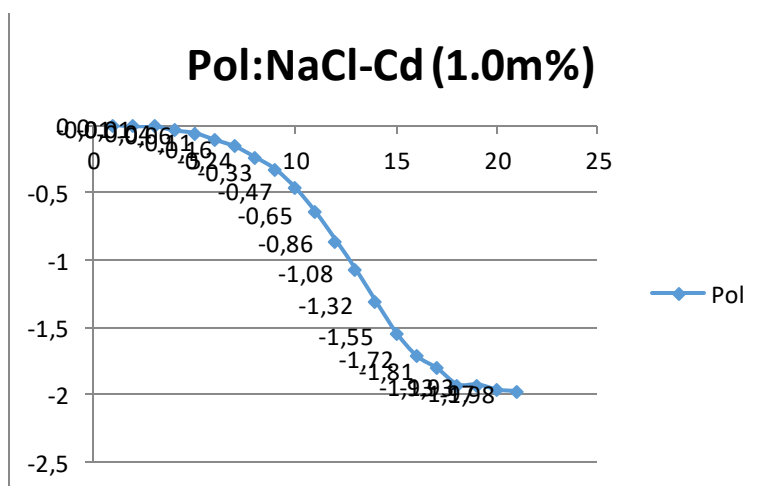
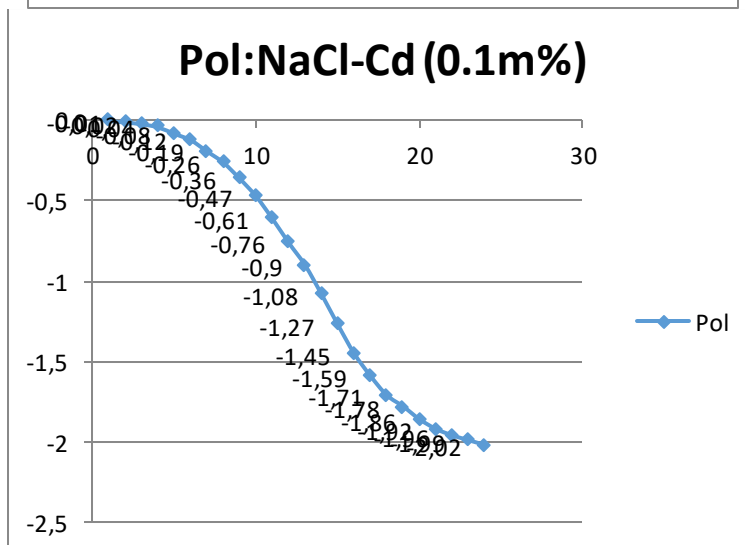
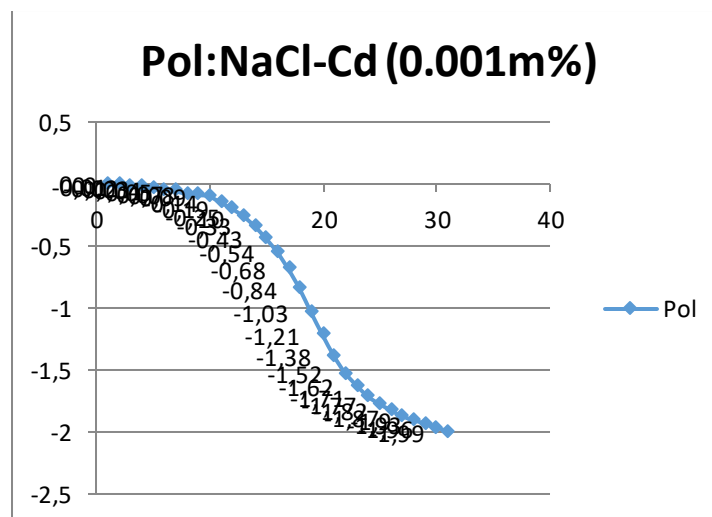
Picture 1 contains the experimental results of the thermal fading of the electronic F - color centers in NaCl crystals chemically pure and with different Cd concentrations.

The polynomials (Polynomial: 1-NaCl-chemically pure, 2-4) show the mathematical modeling of F - color centers with different Cd concentrations in NaCl crystals.



Pic.1 Experimental curves of thermal fading of F – color centers in NaCl crystals with different Cd concentrations: 1-NaCl-chemically pure, 2-0.001 m%, 3-0, 1 m%, 4-1,0 m%.





#### Conclusion:

There were compared the experimental data of thermal fading of the electronic F – color centers with the computer based results. It is explored that the developed mathematical model provides enough equivalence of these results with the experimental data.

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