MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
'Vasyl Stefanyk' Precarpathian National University
Physico-Chemical Institute
SEC "Nanomaterials in Accumulation and Generation of Energy Devices"
ACADEMY OF SCIENCE OF HIGH SCHOOL OF UKRAINE
STATE AGENCY OF SCIENCE, INNOVATION AND INFORMATION OF UKRAINE
State Fund Of Fundamental Research
NATIONAL ACADEMY OF SCIENCE OF UKRAINE
'V.E. Lashkarev' Institute of Semiconductor Physics
'G.V. Kurdyumov' Institute of the Physics of Metals
'V.I. Vernadsky' Institute of General and Inorganic Chemistry
Chuiko Institute of Surface Chemistry
Ukraine Physics Society
Ivano-Frankivsk CSII
Institute of innovation research
Institute of General Physics RAS (Russia)
B.I. Stepanov Institute of Physics NAS of Belarus (Belarus)
Gazy University (Turkey)

PHYSICS AND TECHNOLOGY OF THIN FILMSAND NANOSYSTEMS

XIV INTERNATIONAL CONFERENCE

Materials

20-25, May, 2013

Ivano-Frankivsk, Ukraine

МИНИСТЕРСТВО ПРОСВЕЩЕНИЯ И НАУКИ УКРАИНЫ
ГВУЗ «Прикарпатский национальный университет имени Василия Стефаника»
Физико-химический институт
НОЦ «Наноматериалы в приборах генерирования и накопления энергии»
АКАДЕМІЯ НАУК ВИЩОЇ ШКОЛЫ УКРАИНИ
ГОСУДАРСТВЕННОЕ АГЕНТСТВО ПО ВОПРОСАМ НАУКИ, ИННОВАЦИИ И ИНФОРМАЦИИ УКРАИНЫ
Государственный фонд фундаментальных исследований
НАЦИОНАЛЬНАЯ АКАДЕМИЯ НАУК УКРАИНЫ
Институт физики полупроводников имени В.Е. Лашкарева
Институт металлофизики имени Г.В. Курдюмова
Институт общей и неорганической химии имени В.И. Вернадского
Институт химии поверхности им. О.О.Чуйка
Украинское физическое общество
Ивано-Франковский ЦНТИ
Институт инновационных исследований
Институт общей физики РАН (Росийская Федерация)
Институт физики им. Б.И. Степанова НАН Белоруси (Республика Белорусь)
Университет Гази (Турция)

ФИЗИКА И ТЕХНОЛОГИЯ ТОНКИХ ПЛЁНОК И НАНОСИСТЕМ

XIV МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ

Материалы

20-25 мая 2013 года

Ивано-Франковск, Украина

Logical Model of Thin Film Display Elements

Bushma A.V.

Borys Grinchenko Kyiv University, Ukraine

Use of general analytical representations that are based on principles of information transform for research and the analysis will allow to provide the uniform methodological approach to the description of information display systems (IDS) hardware decisions. As a result, creation of technical realizations and their criterial optimization becomes simpler. However, these analytical approaches are developed insufficiently.

The analysis and analytical interpretation of information processing in the ergatic optoelectronic system and its units has been represented in this work.

The formalized approach to signal processing in IDS allows to simplify generalized description of symbol formation at display information area (IA). Let's consider formation of an optical image of a symbol S_n from the set $\tilde{\mathbf{A}}_n$ of separate thin film IA elements, that is $S_n \Leftrightarrow \tilde{\mathbf{A}}_n$. Then, for each element a_{i_n} it is possible to write down

$$a_{i_n} = y_{\mathrm{SO1}}\left\{ y_{\mathrm{SL1}}\left(Z_i^{\mathrm{E}} \right) \right\},$$

where a_{i_n} is the i-th element of an optical symbol S_n; y_{SO1} – operator corresponding to electrooptical transformation in an element of display; y_{SL1} – logic function of this element; Z_i^{E} – signal of excitation of an element $a_{i_n} \in \tilde{\mathbf{A}}_n$.

The functional analysis has shown that practically for all the types of IA elements used in output units of means for display and information registration, the logic component y_{SL1} of realized conversion y_{S} can be presented as a function of a logic gate.

Practical interest is related with definition of the logical function corresponding to the operator y_{SL1}. For this purpose, it is necessary to sequentially submit all possible combinations of logical signals to inputs of the investigated structure and to fix the received output response. Thus, we generate the truth table of a logic gate and, as a result, we can define its type.

It is shown that excitation of arbitrary thin film IAE $\tilde{a}_{p i_n}$ can be presented in the following aspect

$$\tilde{a}_{p i_n} = y_{\mathrm{SO1}}\left\{ \overline{\overline{z_1 + z_2}} \right\}$$

The obtained results allow formalizing the description and modeling of IDS used in electronic equipment both in whole and in their separate units by logical representation of appropriate functions. It forms an analytical basis for complex optimization and hardware minimization of technical decisions in thin film IDS, as well as essential increase in their reliability.