Institute of Electronic Engineering and Nanotechnologies "D.GHITU" ASM

University of the Moldavian Academy of Sciences
National Museum of Archaeology and History of RM
Association of Technico-Scientific Societies of RM
Humboldt Club Moldova

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Symposium "NANO-2011"

100TH ANNIVERSARY OF THE DISCOVERY OF SUPERCONDUCTIVITY
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International Year of CHEMISTRY 2011

NANO-2011

Cooperation and Networking of Universities and Research Institutes – study by doing research

6 – 9 October 2011, Chişinău, Moldova

Program

&

Abstract Book

Kishinev, 2011

In a number of articles of the author[1], the approach is developed for interpretation of changes or "kinematics" of the circuit regimes on the basis of projective geometry. The changes of regime parameters are introduced otherwise. Therefore, as if obvious changes in a form of increments are formal and do not reflect of substantial aspect of the mutual influences: resistances → currents.

The offered approach allows obtaining the convenient formulas of recalculation

1. Penin A. About the Definition of Parameters and Regimes of Active Two-Port Networks with Variable Loads on the Basis of Projective Geometry. *WSEAS TRANSACTIONS on CIRCUITS and SYSTEMS*, Issue 5, Volume 10, May 2011. http://www.worldses.org/journals/circuits/circuits-2011.htm

45. Coordination chemistry approaches to nanostructured materials

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Coordination chemistry can be used to create a variety of nanostructured materials using a bottom-up approach. For example, nanoscale coordination clusters based on paramagnetic metal ions can have very large magnetic spins and show properties such as Single-Molecule Magnet behavior. On the other hand, small coordination clusters carrying highly functionalized ligands can be used to divide space into nanoscale organic and inorganic regions (Fig 1a) and large coordination clusters can be used a Super Secondary Building Units (SSBUs) linked by small bridging ligands to give Super Metal Organic Frameworks, or SMOFs (Fig 1b). Finally, relatively small ligands influence the shape and phase of mineral structures mimicking biomineralization processes (Fig 1c).

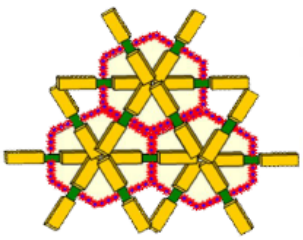
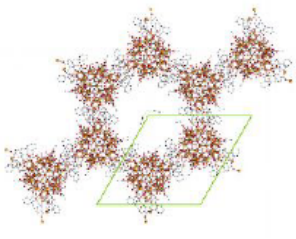
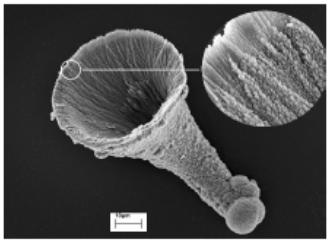


Figure 1a



1b



1c

46. Josephson Effect in SIFS Junctions at Arbitrary Scattering

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The interplay between dirty and clean limits in Superconductor-Ferromagnet-Superconductor (SFS) Josephson junctions is a subject of intensive theoretical studies [1, 2]. SIFS junctions, containing an additional insulator (I) barrier are interesting as potential logic elements in superconducting circuits, since their critical current I_c can be tuned over a wide range, still keeping a high I_cR_N product, where R_N is the normal resistance of the junction. They are also a convenient model system for a comparative study of the 0-π transitions for arbitrary relations between characteristic lengths of the F-layer: the layer thickness d, the mean free path l, the magnetic length $\xi_H=v_F/2H$, and the nonmagnetic coherence length $\xi_0=v_F/2\pi T$, where v_F is the Fermi velocity, H is the exchange magnetic energy, and T is the temperature. The spatial variations of the order parameter are described by the complex coherent length in the ferromagnet $\xi_F^{-1}=\xi_1^{-1}+i\xi_2^{-1}$. It is well known, that in the dirty limit ($l<<\xi_{1,2}$) described by the Usadel equations both $\xi_1^2=\xi_2^2=v_Fl/3H$. In this work the spatial distribution of the anomalous Green's functions and the Josephson current in the SIFS junction are calculated. The linearized Eilenberger equations are solved together with the Zaitsev boundary conditions. This allows comparing the dirty and the clean limits, investigating a moderate disorder, and establishing the applicability limits of the Usadel equations for such structures. We demonstrate that for an arbitrary relation between l, ξ_H, and d the spatial distribution of the anomalous Green's function can be approximated by a single exponent with reasonable accuracy, and we find its effective decay length and oscillation period for several values of ξ_H, l and d. The role of different types of the FS interface is analyzed. The applicability range of the Usadel equation is established.

The results of calculations have been applied to the interpretation of experimental data [3] obtained on Nb-Al_2O_3-Cu-Ni-Nb Josephson junctions containing a Ni layer with moderate scattering.

Support by RFBR and SFB TRR-21 is acknowledged.

1. F. S. Bergeret, A. F. Volkov, and K. B. Efetov, Phys. Rev. B **64**, 134506R (2001).
2. J. Linder, M. Zareyan, and A. Sudbo, Phys. Rev. B **79**, 064514 (2009).
3. A. A. Bannykh, J. Pfeiffer, V. S. Stolyarov, I. E. Batov, V. V. Ryazanov, M. Weides, Phys. Rev. B **79**, 054501 (2009).

47. Chisinau 2050 - Weather Manipulation Station

Schafler K. [3]

The long-term artistic project called *2050* focuses on facts and fiction referring to upcoming socio-economical and geo-political shifts and phenomena that possibly could become reality towards the year 2050: phenomena like Weather Manipulation and Geo-Engineering.

Large-scale Geo-Engineering technologies and interventions aim to combat global warming by cooling the climate on the planet. The main scientific approaches to do so include sequestrating carbon dioxide from the atmosphere through e.g. reforestation with C02-sucking artificial trees or reducing solar radiation through, for instance seeding clouds to making them whiter and more reflective or through installing reflecting mirrors in space. Local weather-manipulating interventions and modifications range from protecting harvests and vine stocks from hail through the launch of anti-hail rockets to dispersing clouds and fog in order to providing sunshine for political representation and propaganda like for military parades or openings of big sport events.

Especially anti-hail technologies are researched and used in Moldova today to protect the huge vineyard and fruit tree areas from hail. Political and economical power structures are enforcing these interventions also in Moldova, although there are unclear risks, side-effects and impacts on nature, people and the public sphere as well as there are a lot of geo-political implications to be expected on the long run. During cold war times it was said. "Who controls the weather controls the world." In this context, the ambivalent character of political and socio-economical implications, questions of governance, philosophical aspects and risks is of special interest.

In the frame of this project I realized an artistic intervention in Chisinau in 2010 [1]. This was the *campaign Chisinau 2050 - Weather Manipulation Station [2],* centred around the imagination of the first and one day possibly realized utopian *Weather Manipulation Station* in Chisinau, conceptually based at the abandoned *Hotel National*, an iconic modernist landmark building complex built in 1978 which is currently an object of speculation. The scenario was, that this building will be demolished and that, at its location, a new "utopian" landmark building, the *Weather Manipulation Station* will be erected and dedicated to *Weather Control, Weather Manipulation and Geo-Engineering*. My fiction included that Moldova's main institutions, laboratories and experts in the field of Weather Manipulation, anti-hail services and Geo-Engineering will move into this new Weather Manipulation Station being together able to forming a multi-scientific competence centre, a flagship with potential to influence and brand future Moldovan identity looking towards the year 2050 and based on international impact and reputation.

1. Presented in the frame of *Chisinau_Art & Research in Public Sphere*: conference and interventions, curated by Stefan Rusu, KSA:K Center for Contemporary Art, Chisinau, 2010
2. *Chisinau 2050 – Weather Manipulation Station*: The campaign / intervention consisted of: mobile billboard car touring through the city and a launch event in front of Hotel National involving screening, distribution of imprinted campaign *rain-jackets* (in English, Romanian and Russian) and a talk about weather manipulation with Prof. Dr. Anatolie Sidorenko, Director of Institute of Electronic Engineering and Nanotechnologies AS RM, Chisinau.
3. *Klaus Schafler* is a conceptually and interdisciplinary working visual artist based in Vienna, Austria. His recent art-projects focus on fact and fiction of Weather Modification and Geoengineering technologies and their socio-economic and geo-political impacts on societies and environment. For these projects he was awarded a grant by the art-science initiative of the Austrian Ministry for education, arts and culture, bm:ukk) in 2010/2011.

48. Functional Nanostructures: From the Salvinia Effect to the Single-Atom Transistor

Schimmel Th.

Karlsruhe Institute of Technology (KIT)

Nanotechnolgy is regarded one of the key technologies of the 21st century. Functional nanostructures play an important role both in fundamental research and in a wide range of applications, ranging from functional surfaces and novel materials and coatings to nanoelectronic applications.