2. Förster Th *Ann. Physik* **437** 55 (1948)
3. Galanin M D *Zh. Eksp. Teor. Fiz.* **28** 485 (1955) [*Sov. Phys. JETP* **1** 317 (1955)]
4. Sveshnikov B Ya, Shirokov V I *Opt. Spektrosk.* **12** 576 (1962) [*Opt. Spectrosc.* **12** 320 (1962)]
5. Ynokuti M, Hirayama F *J. Chem. Phys.* **43** 1978 (1965)
6. Blumen A, Manz J *J. Chem. Phys.* **71** 4694 (1979)
7. Alimov O K et al., in *Selektivnaya Lazernaya Spektroskopiya Aktivirovannykh Kristallov i Stekol* (Selective Laser Spectroscopy of Activated Crystals and Glasses) (Trudy IOFAN, Vol. 9, Ed. V V Osiko) (Moscow: Nauka, 1987) p. 50
8. Avanesov A G et al. *Zh. Eksp. Teor. Fiz.* **77** 1771 (1979) [*Sov. Phys. JETP* **50** 886 (1979)]
9. Avanesov A G et al. *Zh. Eksp. Teor. Fiz.* **84** 1028 (1983) [*Sov. Phys. JETP* **57** 596 (1983)]
10. Alimov O K et al., in *Selective Laser Spectroscopy of Activated Crystals and Glasses* (Proc. of the General Physics Institute of the Academy of Sciences of the USSR, Vol 9, Ed. V V Osiko) (New York: Nova Sci. Publ., 1990) Ch. II
11. Basiev T T *J. Physique Colloques* **46** C7-159 (1985)
12. Basiev T T, Doroshenko M E, Osiko V V *Pis'ma Zh. Eksp. Teor. Fiz.* **71** 14 (2000) [*JETP Lett.* **71** 8 (2000)]
13. Basiev T T et al. *Zh. Eksp. Teor. Fiz.* **120** 1362 (2001) [*JETP* **93** 1178 (2001)]
14. Basiev T T et al. *J. Luminesc.* **94–95** 349 (2001)
15. Basiev T T et al., in *Advanced Solid State Lasers: ASSL — 2001* Technical Digest (Washington, DC: Optical Society of America, 2001) p. 93
16. Basiev T T, Doroshenko M E, Osiko V V *OSA Trends Opt. Photon.* **34** 485 (2000)
17. Livanova L D, Saitkulov I G, Stolov A L *Fiz. Tverd. Tela* **11** 918 (1969) [*Sov. Phys. Solid State* **11** 750 (1969)]
18. Ostermayer F W (Jr.), Van Uitert L G *Phys. Rev. B* **1** 4208 (1970)
19. Basieva I T, Pukhov K K, Basiev T T *Pis'ma Zh. Eksp. Teor. Fiz.* **74** 612 (2001) [*JETP Lett.* **74** 539 (2001)]
20. Basiev T T, Pukhov K K, Basieva I T *Chem. Phys. Lett.* **432** 367 (2006)
21. Basiev T T, Basieva I T *Physica A*, submitted
22. Glushkov N A, Basiev T T, Orlovskii Yu V *Ross. Nanotekhnol.* **4** (9–10) 152 (2009) [*Nanotechnol. Russ.* **4** 722 (2009)]
23. Basiev T T, Basieva I T, Glushkov N A *Pis'ma Zh. Eksp. Teor. Fiz.* **91** 254 (2010) [*JETP Lett.* **91** 236 (2010)]
24. Basiev T T, Basieva I T, Glushkov N A *J. Luminesc.* **130** 2305 (2010)
25. Glushkov N A, Basiev T T, Basieva I T *Pis'ma Zh. Eksp. Teor. Fiz.* **93** 777 (2011) [*JETP Lett.* **93** 697 (2011)]
26. Burshtein A I *Usp. Fiz. Nauk* **143** 553 (1984) [*Sov. Phys. Usp.* **27** 579 (1984)]
27. Lucca A et. al. *Opt. Lett.* **29** 1879 (2004)
28. Basiev T T et al. *Kvantovaya Elektron.* **37** 934 (2007) [*Quantum Electron.* **37** 934 (2007)]
29. Alimov O K et. al. "Spectroscopic and laser properties of Yb^{3+} ions in BaF_2–SrF_2–CaF_2 single crystals and nanoceramics", in *Intern. Conf. on Luminescence and Optical Spectroscopy of Condensed Matter: ICL, Lyon, France, 2008*, Book of Abstracts, p. 147, paper Mo-P-005
30. Basiev T T et. al. *Opt. Lett.* **33** 521 (2008)
31. Siebold M et al. *Opt. Lett.* **32** 1818 (2007)
32. Lucca A et al. *Opt. Lett.* **29** 2767 (2004)
33. Alimov O K et al. "Spectroscopic and oscillation properties of Nd^{3+} ions optical centers in SrF_2 crystal", in *The 2nd Intern. Conf. on Physics of Optical Materials and Devices: ICOM, 2009, Herceg Novi, Montenegro, 2009*
34. Orlovskii Yu V et al. *Laser Phys.* **6** 448 (1996)
35. Basiev T T et al. *Opt. Lett.* **35** 4009 (2010)
36. Basiev T T et al. "New visible $SrF_2:Pr^{3+}$ ceramic laser at 639 nm", in *Advanced Solid-State Photonics: ASSP, Istanbul, Turkey, 2011* Technical Digest (Washington, DC: Optical Society of America, 2011) paper AMF1
37. Basiev T T et al. "First visible 639 nm $SrF_2:Pr^{3+}$ ceramic laser", in *CLEO 2011, Munich, Germany, 2011*, paper CA2.2 SUN
38. Basiev T T et al. *Opt. Mater. Express* **1** 1511 (2011)
39. Basiev T T, Thesis for Candidate of Physico-mathematical Sciences (Moscow: Lebedev Physical Institute, 1977)
40. Basiev T T et al. *Kvantovaya Elektron.* **3** (7) 1471 (1976) [*Sov. J. Quantum Electron.* **6** 796 (1976)]
41. Basiev T T et al. *Kvantovaya Elektron.* **36** 591 (2006) [*Quantum Electron.* **36** 591 (2006)]

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Advances in light sources and displays

A G Vitukhnovsky

Commemorating in 2011 the 120th anniversary of the birth of our outstanding compatriot Sergei Ivanovich Vavilov, an optical scientist, it is pertinent to note that his teacher Petr Petrovich Lazarev was the founder of the journal *Uspekhi Fizicheskikh Nauk*. This relationship imposes certain requirements on the report about modern light sources and alphanumeric displays, given below.

S I Vavilov laid the foundations of the science of luminescence in our country. Apart from Sergei Ivanovich's substantial contribution to the development of basic notions about the nature of luminescence, it was due to his organizational talent that our country obtained new light sources — the fluorescent lamps so well known to everyone. Under S I Vavilov's supervision, his associates and students set up an entire branch of power engineering and made a significant contribution to saving electric energy. The high-efficiency phosphors made with the direct participation of S I Vavilov enabled setting up domestic production of TV sets with the shortest possible delay.

A team of scientists supervised by S I Vavilov were awarded the 1951 Stalin (State) Prize for their achievements in the "Development of fluorescent lamps". All recipients of this major award need to be mentioned: S I Vavilov (awarded posthumously), V L Levshin, V A Fabrikant, M A Konstantinova-Shlezinger, F A Butaeva, and V I Dolgopolov. At present, the application of fluorescent lamps, primarily based on thoroughly modernized compact fluorescent lamps, is the solution of choice for illumination.

A few words about the history of light lamps. The year 1872 saw the advent of the first incandescent lamp, which completed the millennial search and revolutionized illumination technology. This happened in Russia, and the first to conjecture the air evacuation from a glass bulb and placing there a carbon rod incandesced by electric current was the brilliant Russian scientist Aleksandr Nikolaevich Lodygin. On May 20, 1873 lamps of his design went on in St. Petersburg. These were eight lanterns with Lodygin lamps. Unfortunately, the pioneer's laurels went not to A N Lodygin but to the outstanding American inventor Thomas Alva Edison, who received the corresponding patent [1]. Edison merely connected with wires a Lodygin

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lamp, an electric generator, a socket, and a plug to make a circuit!

Subsequently, carbon rods were replaced with tungsten spirals. The development of such light sources as mercury, halogen, sodium, and xenon lamps continued. These endeavors were undertaken due to the imperfections of incandescent lamps. Being the best in their time (for 70–80 years), incandescent lamps nevertheless possessed several obvious disadvantages, above all a low luminous efficiency. In particular, the first incandescent lamps exhibited a luminous efficiency of only 1.5 lm W^{-1}. Nowadays, it is ten times higher and amounts to 10–15 lm W^{-1}.

About 10 years ago, a new achievement in electronics entered the realm of lighting engineering: third type of light sources (after thermal and gas-discharge) appeared — light-emitting diodes (LEDs). Today, LEDs are no longer exotic and are competent partners of incandescent and gas-discharge lamps. The efficiency of light sources based on inorganic (semiconductor) light-emitting diodes ranges up to 90 lm W^{-1} [2] over a relatively long lifetime.

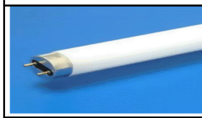
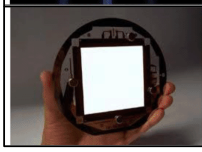
The *virtues of light-emitting diodes* are worthy of mention. The electric current in a light-emitting diode, unlike that in an incandescent lamp or a fluorescent lamp, transforms directly into optical radiation rather than into heat, and theoretically this may proceed almost without losses. Indeed, a light-emitting diode barely heats up at all (with due heat removal), which makes it irreplaceable for certain applications. Furthermore, a light-emitting diode emits in a narrow part of the spectrum, its color is pure, which is particularly appreciated by designers, and ultraviolet and infrared radiations are absent, as a rule. A light-emitting diode is mechanically durable and extremely reliable, its service life amounting to almost 100 thousand hours, which is almost 100 times that of an incandescent lamp, and 5–10 times that of a fluorescent lamp. Lastly, light-emitting diodes are low-voltage electrical appliances and are therefore safe.

The invention of the *organic* light-emitting diode (OLED) [3, 4] in 1987 should be regarded as the next stage of development. Having a low energy consumption, an OLED affords a remarkable color rendering for a low cost and a luminous efficiency of up to 100 lm W^{-1} with the use of phosphorescent organic materials. The characteristics of light sources are collated in Table 1.

At the present time, laboratory specimens of OLED structures exhibit characteristics comparable to those of the best light-emitting diodes from leading world manufacturers. However, it is pertinent to note that the program for the development of the light-emitting diode industry, elaborated by the US Department of Energy (US DOE Solid State Lighting Roadmap, July 2011), follows a strategy whereby the OLED and LED technologies are regarded as mutually complementary technologies rather than competing ones. Among the main disadvantages of the LED are its low overall brightness and a rather poor flexibility. It is precisely this circumstance which gives OLEDs an advantage over LEDs in general illumination systems, for instance, in office lighting.

The world level of OLED technology development has entered the stage of commercialization. This technology accounts for a steadily growing share in the market, which is exemplified by display applications. Considering the scientific and technological achievements, the huge total amount of financing in the world, and the development programs adopted by the leading States and biggest corporations, OLED technology in the area of lighting will undoubtedly meet with success.

Table 1. Characteristics of different light sources.

Category	Type	Luminous efficiency, lm W^{-1}	Radiant efficiency, %
	Candle	0.3	0.04
	100-W incandescent lamp (220 V)	13.8	2.0
	Linear fluorescent lamp	60	9.0
	White light-emitting diode	10 – 90	1.5 – 13
	White OLED	102	15.0

We now turn to advancements in the area of alphanumeric displays (Fig. 1). Quite evident is the progress in connection with changing from classical displays based on electron-beam tubes (recall bulky 'Rubin' TV sets and the dreams of Sony TV sets) to fine plasma panels, and subsequently to modern liquid crystal (LC) monitors which not only are the screens of modern TV sets and notebooks, but also are used in a countless number of so-called gadgets (cell phones, navigators, etc.). However, progress is unstoppable, and different versions of organic light-emitting devices come up to take the place of LC displays: a polymer light-emitting diode (PLED) based on conducting polymers; an OLED based on 'small' molecules of organometallic complexes, and a QD-OLED [an organic matrix with quantum dots (QDs) implanted into it] which makes use of flexible substrates and hybrid materials.

Analysts at Research and Markets (Dublin, Ireland), the leading source for international market research and data, are certain that displays which rely on organic light-emitting diode (OLED) technology will become the main 'engine' of the industrial sector in the next decade. In any case, this

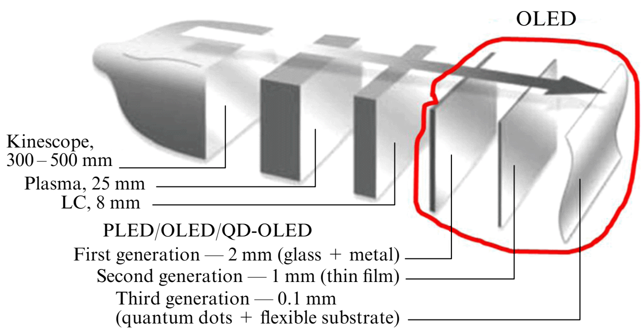


Figure 1. Progress in display technology.

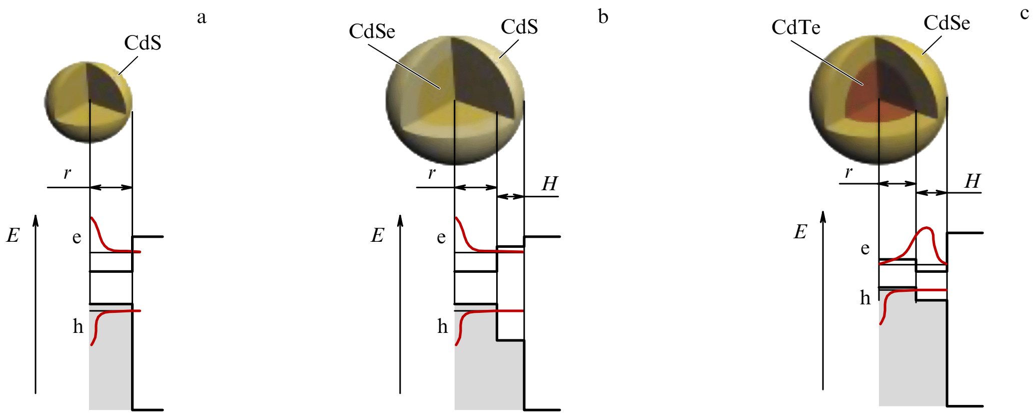


Figure 2. Energy level structure of the most popular colloidal cadmium chalcogenide quantum dots.

conclusion was reached in their report "Energy Efficient Displays Technologies to 2020 — Organic Light Emitting Diodes (OLED) Displays Set to Propel Growth of the Industry."

OLED displays have a huge market potential: according to experts' estimates, their sales volume will reach 10.6 billion dollars by 2020.

For several years, OLED technology has been believed to hold the greatest promise for displays development. In the period from 2005 to 2009, the corresponding market grew on average by 33.9% per year to expand from 256 to 822 million dollars. In the next ten years, an annual growth of 25.5% will persist, according to the analysts at Research and Markets. To date, mobile devices are the main application area of OLED displays. The displays employed in cell phones (this segment now accounts for 65% of the total volume in money terms), digital cameras, players, and other devices of this sort are small in size. The demand will begin to grow when OLED panels of large area come to TV sets, monitors, and personal computers.

Organic displays will supposedly take the place of liquid crystal ones. Therefore, the main factors which moderate the spread of OLEDs are the constant improvement and cost reduction of LC displays. However, analysts believe that technological innovations and a change to mass production will allow reducing the cost of OLED displays.

There is good reason to enlarge on the latest achievement in the area of modern displays — QD-OLED technology. The key element of devices of this kind is a colloidal quantum dot (a nanocrystal) 2–7 nm in size. As a rule, use is made of so-called core–shell quantum dots. Quantum dots prepared by the colloidal chemistry methods [5] are exemplified in Fig. 2, which also depicts the behavior of their energy levels.

Also shown in Fig. 2a are a shell-free CdS quantum dot and the spatial distance distribution of electrons and holes. A CdSe/CdS quantum dot (Fig. 2b) corresponds to the so-called type I nanoheterostructure, where electrons and holes are located in the core. A CdTe/CdSe quantum dot (Fig. 2c) exhibits a different distribution of electrons and holes. This nanoheterostructure belongs to type II: its electron resides primarily in the shell, while its hole is located in the nanoparticle core. (For the classification of heterostructures, see, for instance, Ref. [6].)

By placing quantum dots between two n- and p-type organic conductor layers and applying voltage to the outer electrodes, it is possible to excite the quantum dots and eventually obtain electron–hole radiative recombination [7]. The simplest schematic diagram of a QD-OLED is depicted in Fig. 3.

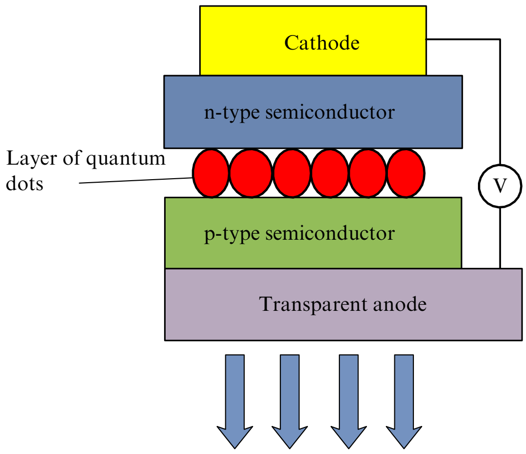


Figure 3. Operating diagram of the simplest organic light-emitting diode (display pixel) with semiconductor quantum dots (QD-OLED).

An obvious advantage of using this scheme is the possibility of tuning the radiation wavelength, which is determined only by the nanoparticle size, as well as its stability (durability, which is achieved by using an inorganic material as the emitter) and the low cost of colloidal nanoparticle synthesis. The high quantum yield of quantum dot electroluminescence is not the least of the factors as well.

Figure 3 demonstrates how the energy structure changes when moving from a bulk material (Fig. 4a, E_g is the energy gap width) to a nanodimensional (Fig. 4b, E_g is the lowest transition energy) one. This quantity is defined by a simple formula: $\Delta E = = h/(2md^2)$, which relates the diameter d of a nanoparticle (quantum dot) to the transition energy.

Clearly, by changing the nanoparticle (quantum dot) size it is possible to obtain radiation in different parts of the visible spectrum, which is required for obtaining a full-color display.

At the present time, the excitation mechanism of quantum dots in QD-OLEDs is still unclear. Let us consider the possible quantum-dot excitation mechanisms illustrated in Fig. 5.

Direct electron–hole recombination may occur at a quantum dot, resulting in its excitation and the consequential emission of a photon with the appropriate energy.

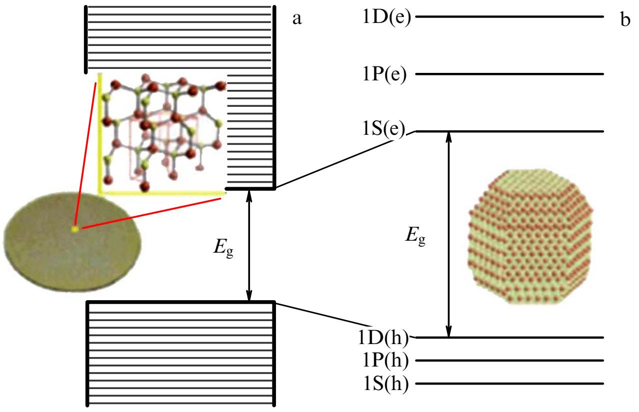


Figure 4. Energy structure of two types of objects: bulk (a), and nanodimensional (b).

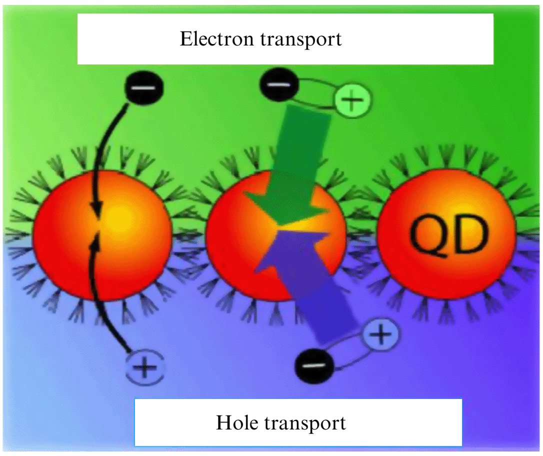


Figure 5. Mechanisms of excitation of quantum dots at the interface between n-type (electron transport) and p-type (hole transport) organic layers.

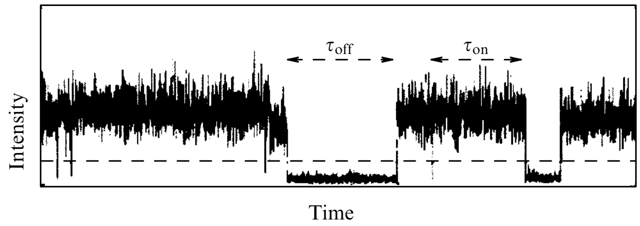


Figure 6. Blinking luminescence of a single quantum dot.

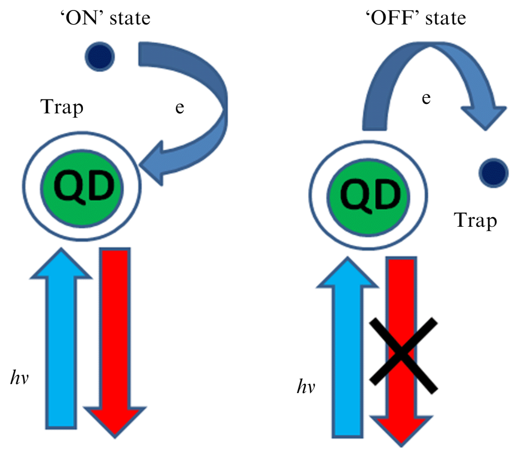


Figure 7. Association of the blinking luminescence of a quantum dot with the capture and release of a charge carrier by a trap.

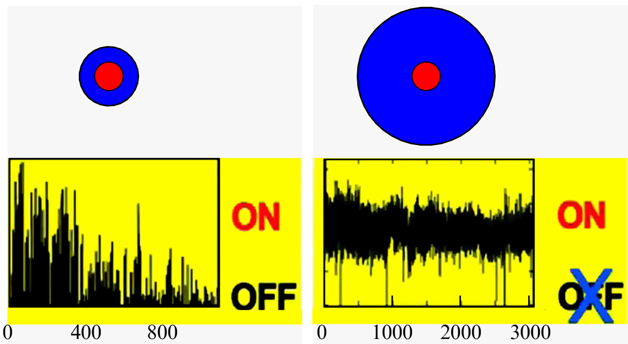


Figure 8. Illustration of the role of the thickness of a core–shell quantum dot shell.

Another scenario is also possible: electron–hole recombination may occur either in the n-type organic layer or in the p-type layer. In these cases, electron excitation energy transfer proceeds from the excited molecule in the organic layer to the quantum dot. Such an energy transfer follows the Förster mechanism [8]. In Ref. [9], for instance, an investigation was made of electron excitation energy transfer from a blue-light-emitting organic conjugated poly[(9,9-dihexylfluorenyl-2,7-diyl)-alt-co(9,ethyl-3,6-carbazole)] polymer to a colloidal CdSe/ZnS core–shell quantum dot. It was shown that the energy transfer proceeded by the Förster mechanism and the polymer acted as the donor, while the quantum dot as the acceptor. The Förster radius was determined equal to (80 ± 15) Å. Investigations into the processes at the organic layer–quantum dot interface are required to make an efficient display pixel. There are also several physical problems which need to be solved to optimize the operation of QD-OLEDs.

It is well known that a quantum dot exposed to continuous excitation emits light discretely [10]. This effect is termed blinking luminescence. Figure 6 exhibits the luminescence intensity of a single quantum dot under continuous excitation. One can clearly see the intervals of light emission and the intervals without light.

The time-varying luminescence intensity of a quantum dot under continuous excitation is characterized by the states 'ON' (light is emitted) and 'OFF' (light is not emitted). One explanation of this effect reduces to variation of the charge of the quantum dot. A dot which 'loses' charge does not exhibit luminescence, but after a lapse of time the charge may 'return' (this is in fact the capture and release of charges by traps at the interface between the quantum dot and the surrounding medium). This process is schematically presented in Fig. 7. Such a phenomenon plays an adverse role in the making of an efficient display pixel. In this connection, it is necessary to investigate the cause of blinking luminescence and find ways to suppress it. There are only primary indications of what role the core–shell quantum dot thickness plays in this phenomenon (see, for instance, Ref. [11]). Figure 8 depicts the blinking luminescence of a quantum dot with different shell thicknesses.

In a brief report it is impossible to cover all aspects of the progress in the area of modern light sources and displays, but even the individual case of employing a QD-OLED as a pixel makes evident the vast possibilities of using hybrid nanomaterials. Combining colloidal semiconductor nanoparticles (quantum dots) and organic interfaces does lead to a qualitatively new display type, which possesses a long operating lifetime, a high luminous efficiency, and the possibility of tuning the output radiation wavelength throughout the visible spectral range. It is evident that optoelectronic devices of this kind would be in demand by the industry. On the other hand, the complexity of the organic interface–quantum dot system is of considerable interest for fundamental physics.

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References

1. Edison T A, U.S. Patent No. 865,367 (1907)
2. Zheludev N *Nature Photon.* **1** 189 (2007)
3. Tang C W, VanSlyke S A *Appl. Phys. Lett.* **51** 913 (1987)
4. Bochkarev M N, Vitukhnovsky A G, Katkova M A *Organicheskie Svetoizluchayushchie Svetodiody* (*OLED*) [Organic Light-Emitting Diodes (OLED)] (N. Novgorod: DEKOM, 2011)
5. Murray C B, Norris D J, Bawendi M G *J. Am. Chem. Soc.* **115** 8706 (1993)
6. Alferov Zh I *Fiz. Tekh. Poluprovodn.* **32** 1 (1998) [*Semiconductors* **32** 1 (1998)]
7. Coe S et al. *Nature* **420** 800 (2002)
8. Förster Th *Discuss. Faraday Soc.* **27** 7 (1959)
9. Anni M et al. *Appl. Phys. Lett.* **85** 4169 (2004)
10. Barkai E, Jung Y, Silbey R *Annu. Rev. Phys. Chem.* **55** 457 (2004)
11. Chen Y et al. *J. Am. Chem. Soc.* **130** 5026 (2008)

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Direct experimental demonstration of the second special relativity postulate: the speed of light is independent of the speed of the source

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In memory of S I Vavilov
and his Postdoc A M Bonch-Bruevich

1. Introduction

Special relativity is undoubtedly the most famous physical theory. The popularity of the special theory of relativity (STR) is related to the simplicity of its main principles, the imagination-staggering paradoxicality of the conclusions, and its key position in 20th-century physics. Special relativity has brought unprecedented fame to Albert Einstein, and it is this fame that became one of the reasons for incessant attempts to revise the theory. Among professional physicists, the debates around STR ended more than 50 years ago. A quotation from Wikipedia: "All the experimental data of the high-energy physics, nuclear physics, spectroscopy, astrophysics, electrodynamics, and other fields of physics, within the experimental errors, perfectly agree with the STR. In particular, in quantum electrodynamics (unification of the STR, quantum theory and Maxwell equations), the value of the anomalous magnetic moment of electron coincides with theoretical calculations to within 10^{-9}."

Still, editorial boards of physical journals continue to be bombarded by amateurish proposals to revise the STR [1] (see also paper [2]). In spite of an infinite amount of evidence of the validity of the STR available nowadays, efforts to refute or to essentially revise it do not cease, being motivated by the insufficient reliability of experimental confirmations of its basic principles, including, in particular, its second postulate, which states the constancy of the speed of light for all inertial reference systems regardless of the light source velocity. It is noteworthy that, most frequently, the criticism is directed at earlier experiments aimed at searching for the 'ether wind' [3], which were traditionally considered as almost the only experimental proof of the validity of the STR. While not penetrating into the pages of serious scientific literature, the attempts to revise the STR overwhelm the mass media and Internet, which cannot help disorienting unprofessional readers, including schoolchildren and students. The situation was additionally aggravated in the years of celebration of the centenary of the relativity theory, counted from the date of publication of the historical article by Einstein [4], considered as the birthday of the STR. [1] At the same time, distrust of the STR (from the side of social community unencumbered by knowledge) also existed 60 years ago, when S I Vavilov charged his PhD student A M Bonch-Bruevich with the experiment on direct verification of the second postulate of the special relativity [10].

The incessant attacks on the STR are motivated by discrepancies in evaluation and interpretation of the first relativistic experiments by Fizeau, Michelson, and others. Specifically, one of Michelson's successors — Miller [11] — insisted, until his last years, that, in those experiments, a certain seasonal systematic effect was observed, which he interpreted as a partial drag of the 'luminiferous ether' by Earth upon its orbital motion around the Sun. After definitive establishment of the validity of the STR these experiments have practically ceased to be reproduced, with the accuracy of such measurements still remaining rather low.

There are few who know that the first famous negation of the existence of the 'ether wind' was made by Michelson [12] in 1881 on the basis of rather unconvincing observations. The achieved accuracy of the measurements only slightly exceeded the magnitude of the effect proper expected based on the

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[1] Of the innumerable critical publications, we will restrict ourselves by mentioning only two: the review article of N Noskov, divesting 'centennial relativistic fraud' [5], and the recent publication by Sokolovs [6] reviving the old 'ballistic' hypothesis of Ritz [7]. The jubilee of the STR was celebrated in a peculiar way by St. Petersburg Polytechnical University, which published again, in 2009, the pretentious monograph *Myths of the Relativity Theory* by A A Denisov [8], whose extravagant constructions had been refuted by lecturers of the same university 20 years ago [9].