C0r0n@ 2 Inspect

Review and analysis of scientific articles related to experimental techniques and methods used in vaccines against c0r0n@v|rus, evidence, damage, hypotheses, opinions and challenges.

Thursday, August 19, 2021

The spintronics of graphene Was Pandora's box uncovered here?

Reference

Maassen, J .; Ji, W .; Guo, H. (2011). Graphene spintronics: the role of ferromagnetic electrodes = Graphene spintronics: the role of ferromagnetic electrodes. Nano letters, 11 (1), pp. 151-155. https://doi.org/10.1021/nl1031919

Introduction

1. Spintronics is the scientific-technical branch in charge of studying the charge of the electron and its spin. A "spin" is the rotation of the electron about itself. It takes a unique value (quantum number) that is equivalent to the orbital angular momentum. Its applications in quantum computing take advantage of the ability to reflect qubits or quantum bits (Burkard, G .; Engel, HA; Loss, D. 2000 | Leuenberger, MN; Loss, D. 2001), in a way similar to how a computer would do it, altering its rotation values by means of nano magnetic fields. This is possible due to the magnetoresistance effect of electrons and their spins, having developed spin valves with high sensitivity to magnetic fields (Gergs, NM; Bender, SA; Duine, RA; Schuricht, D. 2018 | Braun, M. ; König, J .; Martinek, J. 2006), which demonstrate the viability of the concept.

Facts

1. The study analyzes how to operate the spintronics of graphene using Cobalt-Nickel ferromagnetic electrodes, which achieve spin spin efficiencies in a range of 60-80%, which means a good capacity for computational interaction. In other words, it is possible to transfer the principles of binary and quantum computing, as in a processor or PC chip on a motherboard, to graphene, on a nanometric scale. It is stated that " *This large spin filtering (referred to the incidence of the induced magnetic field) results from the specific interaction of materials between graphene and FM (ferromagnetic interface), which destroys the linear dispersion relationship of the graphene bands and leads to spin-dependent energy gap opening*". This is the ability to modify the physical properties of the spin at will, to alter its natural values." *The minority spin forbidden band resides in higher energy than the majority spin forbidden band ..., a characteristic that gives as result dominated currents of the large minority spin* . "In other words, by altering the energetic current of the spin, it is possible to modify its angular momentum and its polarization, recording a different value at will.

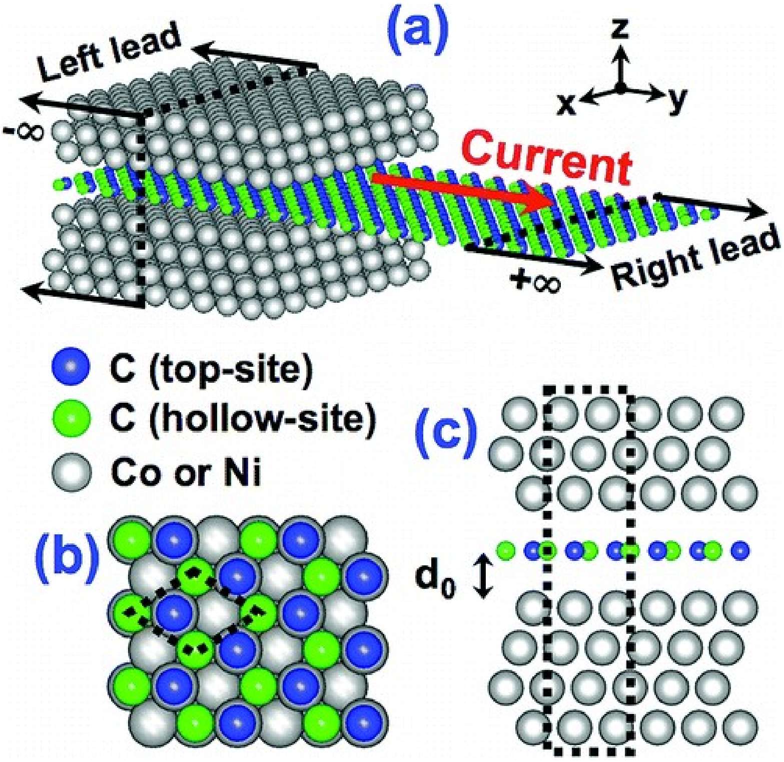

Fig. 1. Graphene circuit diagram and Cobalt-Nickel electrodes. (Maassen, J .; Ji, W .; Guo, H. 2011)

2. The authors introduce the article by stating the objective of spintronics and magnetoelectronics in the following way " *the field of spintronics, or magnetoelectronics, uses the degree of freedom of rotation of electrons and their inherent magnetic moment to influence or control the properties of a circuit* ". Clearly, the development of circuits, transistors and ultimately, nano-scale chips or processors is being sought. In this sense, graphene has all the properties necessary for the development of spintronic devices, as mentioned below "*Graphene, a 2D (two-dimensional) lattice of C (carbon) atoms, is a gapless material with linear scattering electronic bands that bind at the Fermi level at conical points (Dirac) located at the K points in the zone of Brillouin. Graphene has received a lot of attention due to its exceptional properties, including zero effective mass carriers with extremely large mobilities, and is poised to play a role in the future of nanotechnology. Among other qualities, graphene has a weak spin-orbit interaction due to the low atomic number of C (carbon), resulting in long spin coherence lengths. Therefore, graphene is a promising material for applications in spintronic devices, where the unique electronic properties of graphene can be exploited within the context of magnetoelectronics*". In this statement, the magnetic stability of graphene and its ability to magnetically alter the properties of its spins is clear.

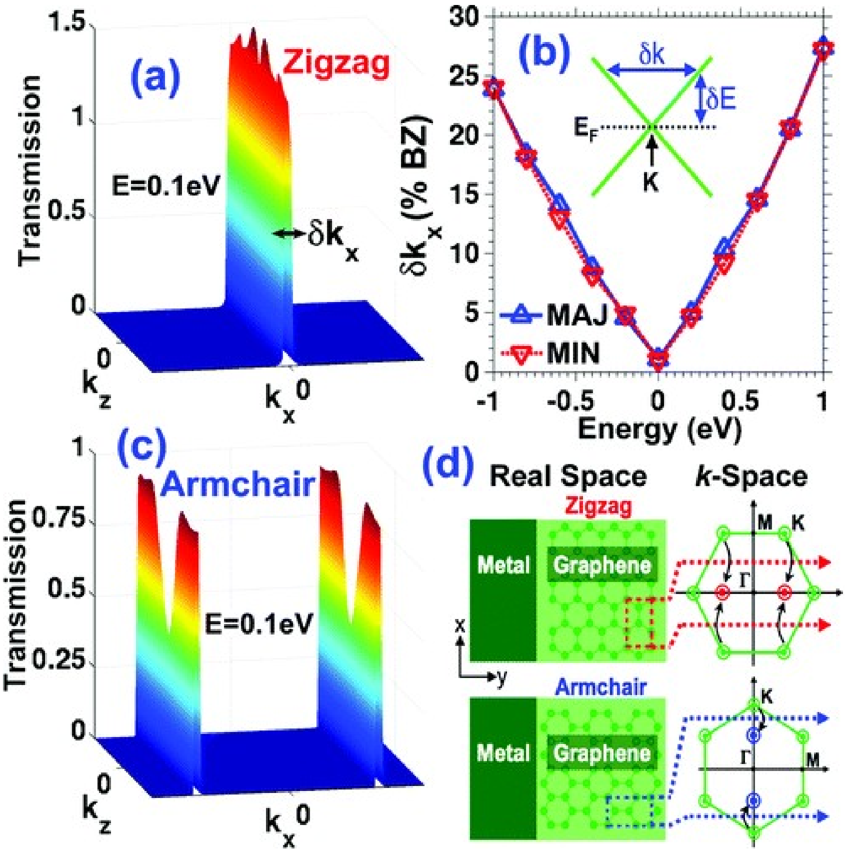

Fig. 2. Spin polarization change from an energetic charge in the magnetic field that forms with the electrodes. (Maassen, J .; Ji, W .; Guo, H. 2011)

3. However, the authors observe some problems that they try to solve in the development of their paper " *Generating and injecting a polarized spin current into graphene is of vital importance for the development of graphene-based spintronics. Nanotapes are theoretically predicted to Graphene, unlike pure graphene, has a local magnetic moment at the zigzag edges, but a significant limitation arises in the presence of edge clutter and impurities that have been shown to suppress this magnetic state. Therefore, a efficient spin injection into graphene for the realization of a prototypical spintronic device*". Clearly the researchers find the problem of impurities in the material. We must not forget the publication date of the article, which dates back to 2011. With posterity, techniques and methods were developed that have achieved a graphene of maximum purity and quality, a subject that is widely covered in the scientific literature (Konwar, S .; Dhapola, PS; Gupta, M .; Singh, RC; Singh, PK 2019 | Bu, Y .; Liang, H .; Gao, K .; Zhang, B. ; Zhang, X .; Shen, X .; Zhang, J. 2020 | Manoratne, CH; Rosa, SRD; Kottegoda, IRM 2017 | Rosillo-Lopez, M .; Salzmann, CG 2016 | Jasim, DA; Lozano, N. ; Kostarelos, K. 2016 | Zhao, MQ; Zhang, Q .; Huang, JQ; Tian, GL; Chen, TC; Qian, WZ; Wei, F. 2013). Obviously, for the years before the great pandemic of c0r0n @ v | rus, this problem had already been solved,so the degree of precision for spintronic editing would be greatly increased. In fact, the graphene spintronics book of (Józsa, C .; van-Wees, BJ 2019) which addresses " *the dynamics of spin in graphene field effect transistors with ferromagnetic injector and detector contacts; the effects related to spin transport in graphene; the Fermi level for altering the magnetism and rotation of the spin by using an electrostatic gate to charge the graphene with electrons or holes to a density, creating a field-effect transistor-type device; The method of detecting the transport of spin electrically through a valve of two-terminal spin, where graphene is contacted by two ferromagnetic electrodes .* "

4. In order to elaborate the spintronic device of the experiment, a 2D graphene sheet was placed between two Cobalt-Nickel ferromagnetic electrodes, " *In this way, the polarized spin current is mainly dominated by the coupling between layers ... In addition, the geometry In-plane current flow, with transport occurring in parallel to graphene, is the most common experimental and theoretical device architecture. In such systems, the source and drain electrodes are composed of FM-coated graphene (ferromagnetic materials). which, depending on the nature of the chemical bond, can hybridize and result in a complex electronic structure* . " In the case of research, cobalt-nickel hybridizes strongly with graphene. Nevertheless, "*It is crucial to properly characterize the detailed atomic structure, in order to obtain the correct electronic states at the interface and to precisely analyze the polarized spin transport properties of the device. Given the nature of this problem, an ab-initio atomistic model must be used for a precise treatment of the chemical interaction in contact* . "This statement demonstrates beyond any doubt the ability to operate quasi-atomic-scale nanotransistors in the form of graphene. , through the alteration of magnetic fields and therefore electromagnetic wave emissions, given the absorption properties of graphene (Avdoshenko, SM; Ioffe, IN; Cuniberti, G .; Dunsch, L .; Popov, AA 2011 | Ray, SC; Soin, N .; Makgato, T .; Chuang, CH; Pong, WF; Roy, SS; McLaughlin, JA 2014 | Hashmi, A .; Hong, J. 2014 | Wang, J .; Xu, X .; Mu, X .; Ma, F .; Sun, M. 2017). On the other hand, it is worth noting that ferromagnetic electrodes can also be made of Fe3O4 or magnetite, a material that usually complements graphene oxide, as extracted from the following magnetoresistance studies for spintronics, see (Liao, ZM; Wu, HC; Wang, JJ; Cross, GL; Kumar, S .; Shvets, IV; Duesberg, GS 2011 | Kharissova, OV; García, BO; Kharisov, BI; Méndez, UO 2016 | Tsuchiya, T .; Terabe, K. ; Ochi, M .; Higuchi, T .; Osada, M .; Yamashita, Y .; Aono, M. 2016).

Other studies

1. In the work of (Soriano, D .; Munoz-Rojas, F .; Fernández-Rossier, J .; Palacios, JJ 2010) it is analyzed " *how the hydrogenation of graphene nanoribbons in small concentrations can open spaces towards applications of spintronics based on carbon, regardless of any specific edge termination or passivation of the nanoribbons* . " This could suggest that hydrogen can interact with graphene to configure the necessary electrodes that are required to make up the transistor, further simplifying the transistor model. In fact this is confirmed in the following statement "*Density functional theory calculations show that an adsorbed H (hydrogen) atom induces a spin density in the vicinity of π orbitals whose symmetry and degree of localization depends on the distance to the edges of the nanotape* . " add the following "*Under the influence of a magnetic field, the hydrogenated AGNR (graphene nanotape) behaves like a dilute paramagnetic semiconductor for small concentrations of H (hydrogen). At large concentrations, when the spin density is zero everywhere, the influence of the field can only lead to a smaller diamagnetic response. At intermediate concentrations, where the clouds of magnetization induced by the H (hydrogen) atoms interact with each other, it is possible to change from the AF to the F state by applying a sufficiently strong magnetic field*."This shows that the application of magnetic fields on graphene transistors affect its wireless programming and, quite likely, its functional / operational performance. On the other hand, hydrogen electrodes can induce the magnetization of graphene, which would explain the electromagnetic properties referred to in the article (González-Herrero, H .; Gómez-Rodríguez, JM; Mallet, P .; Moaied, M .; Palacios, JJ; Salgado, C .; Brihuega, I. 2016).

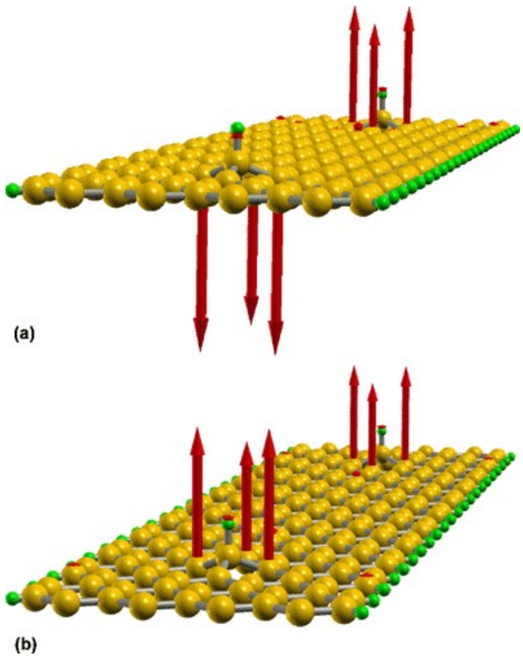

Fig. 3. Antiferromagnetic state a) and ferromagnetic state b) altered by magnetic fields. Note the hydrogenation of the edges of the graphene sheet that acts as electrodes, further simplifying the transistor model. (Soriano, D .; Munoz-Rojas, F .; Fernández-Rossier, J .; Palacios, JJ 2010)

2. The research of (Li, L .; Qin, R .; Li, H .; Yu, L .; Liu, Q .; Luo, G .; Lu, J. 2011) analyzes " *the possibility of functionalized graphene as a device High performance two-dimensional spintronic. It is found that graphene functionalized with O (oxygen) on one side and H (hydrogen) on the other side in the electrode conformation, make up a ferromagnetic metal with a spin filter efficiency of up to 54 % with finite bias ... the spin valve is controlled by introducing a magnetic field to stabilize its ferromagnetic state. The resulting room temperature magnetoresistance is up to 2200%, which is an order of magnitude higher than the experimental values available* ". Finally they conclude that "*Compared to ultra-thin graphene nanoribbon spintronic devices, functionalized graphenes allow a much larger current with fewer requirements on manufacturing technique and are more competitive* . "

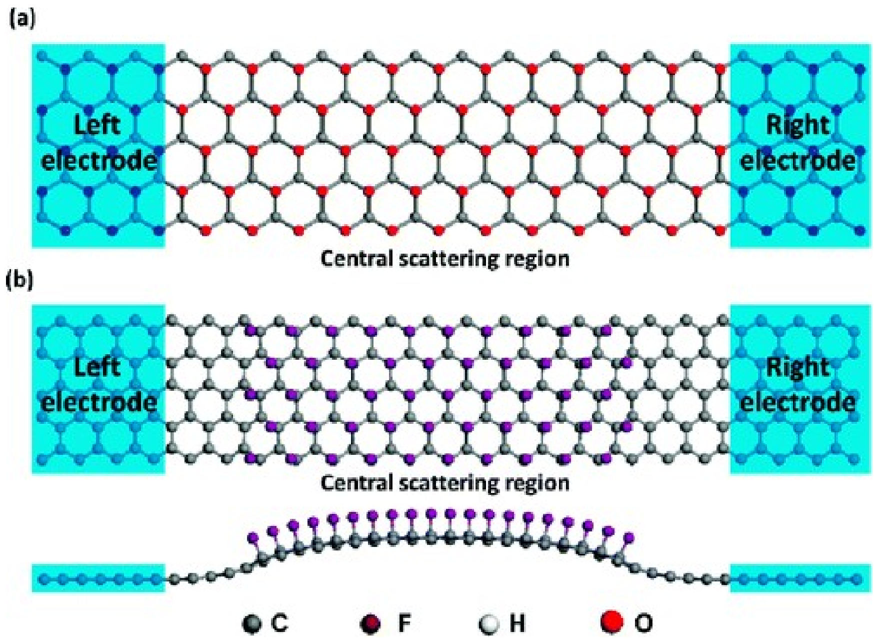

Fig. 4. Schematic of a graphene transistor with oxygen and hydrogen atoms. (Li, L .; Qin, R .; Li, H .; Yu, L .; Liu, Q .; Luo, G .; Lu, J. 2011)

3. Another property studied is the change of rotation of the spins in the quantum dots. According to (Gergs, NM; Bender, SA; Duine, RA; Schuricht, D. 2018) it is possible to commute the rotation of the spins to change their properties and values in order to encode the necessary computational values. This is reflected in his following statement " *We show that quantum transport through a spin-degenerate quantum dot provides unique control over the spin pairs acting on the attached nanomagnets, allowing the effective change of the nanomagnets of a configuration. parallel to an antiparallel and vice versa*". This shows that it is possible to develop nanoelectronics or spintronics based on all types of semiconductors, including graphene and its derivatives.

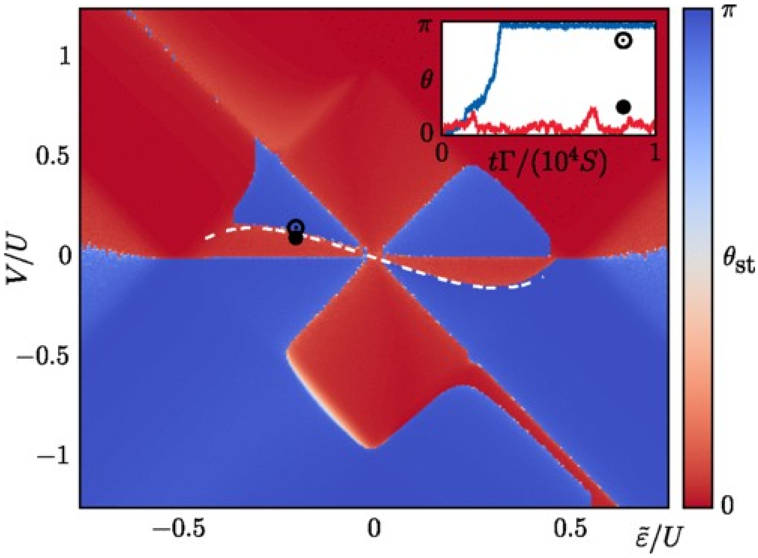

Fig. 5. Switching diagram showing the spin opening angle according to the bias load of the applied voltage. (Gergs, NM; Bender, SA; Duine, RA; Schuricht, D. 2018)

4. The study by (Akram, KB; ul-Hassan, SM; Ahmed, A .; Hamayun, MA; Rafique, M .; Manzoor, S. 2020) stands out for the special property of reduced graphene oxide rGO / Fe3O4 of having a " *Giant* " magnetoconductivity in AC (Alternating Current), essential for assembling semiconductor transistors. Specifically, it addresses " *the structural, AC transport and magnetotransport properties of reduced graphene oxide (rGO) compounds and magnetite nanoparticles measured in the frequency range of 10 Hz to 2 MHz and in static magnetic fields up to 500 mT* ". *In conclusion they affirm that the "AC magnetoconductivity at room temperature is 57% (af = 254 kHz) and 40% (af = 10 Hz) in a magnetic field B = 500 mT for the sample with 40% by weight of magnetite nanoparticles. This is much higher than that obtained in DC (Direct Current) magnetotransport, where the magnetoconductivities at room temperature in similar compounds are typically 10% or less in comparable magnetic fields* . "This affects the efficiency of graphene transistors of 2D single layer, whose electrons can operate with higher resistivity.

Feedback

1. The spintronics of graphene shows that nano-scale circuits and transistors can be created that could perfectly be inoculated through a vaccine. It is also shown that magnetic electrodes are required to obtain transistors and other spintronic components. This would explain, once again, the magnetic phenomenon of people inoculated with c0r0n @ v | rus vaccines. Together with this, it is also shown that ferromagnetic electrodes can be made of $Fe3O4$ magnetite, which coincides with the typical combinations of graphene oxide and its multitude of applications, for example, the injection of aerosols into the atmosphere, aerogels, hydrogels, therapy nanoparticles against cancer, gene therapies, drug delivery, biocides, fertilizers,pesticides and their special properties of overcoming the blood-brain barrier, creating magnetic fields, among others,see section on graphene oxide and Fe3O4 aerogels where all the articles that justify these uses and properties are cited.
2. With all the information analyzed so far, it is hypothesized that the materials necessary for the assembly of spintronic devices (that is, graphene oxide and Fe3o4, or other materials not yet identified), are found in c0r0n vaccines. @v | rus and are indirectly introduced into the body through food, water, air and physiological serums, among others. However, it remains to be clarified whether there is nanotechnology or nanobots capable of assembling said material, in order to achieve its operational capacity. This is not exclusive of the possibility that materials can self-assemble through electromagnetic fields, by means of " *Teslaphoresis*"(Bornhoeft, LR; Castillo, AC; Smalley, PR; Kittrell, C .; James, DK; Brinson, BE; Cherukuri, P. 2016) which is a magnetic movement aimed at the self-assembly of carbon nanotubes, for which requires a tesla coil that generates an electromagnetic field or a potential difference between electrodes, see video of the experiment. Obviously the bovine tesla could be replaced by the electromagnetic waves of 5G. If the presence of magnetite Fe3O4 is demonstrated, or any other ferromagnetic material, or any other nanometric electrode mechanism, this theory could have the appearance of being verified, since a specific order of the nanomaterials would not be required, as they would be found in the aqueous solution of the vaccine. For this reason, the definitive study of the contents, materials and observable elements in the vaccine is so important to those already referred to in the preliminary study (Campra, P. 2021).
3. If it is assumed that the provision of spintronic devices is very likely, it is worth reflecting on the capabilities and possibilities of this technology. It seems logical that the transistors and circuits had the function of identifying the device, this would be the MAC (Media Access Control) address, which is a unique 48-bit identifier for its connection to the network. Obviously if there is a network device, there should be a mechanism that allows it to connect or at least bind. This requires a radio device, responsible for modulating and transmitting the signal, and on the other hand a controller, in the form of a basic CPU with digital signal processor and link controller. Many electronic devices that are usually connected via bluetooth meet these requirements,and for this reason it is possible to hypothesize that graphene transistors can be connected to the network, in the same way as the IOT (Internet of Things). In fact, according to (Yang, X., Liu, G., Balandin, AA and Mohanram, K. 2010) they managed to create "*a single-transistor graphene amplifier using the key concept of biasing in analog circuits ... Compared to traditional amplifiers based on unipolar devices, the proposed single-transistor amplifier provides greater controllability in the field, as you can switch between the three modes during operation. To our knowledge, this is the first work to show that a single transistor amplifier based on a three terminal device can be configured in the field to function as both a common source amplifier and a common drain amplifier*."And to all this, they add that graphene transistors can use modulation and coding techniques to establish

communication or link with other devices, indicating that" *Both PSK (phase shift modulation) and FSK (frequency shift encoding) are important digital modulation techniques. PSK is widely used in wireless applications such as Bluetooth, Radio Frequency Identification (RFID), and Zig-Bee, while FSK is often used in radio and audio systems*.". Another relevant detail of this work (Yang, X., Liu, G., Balandin, AA and Mohanram, K. 2010) is the frequency of the operating signal of the developed transistors, 4, 8 and 10 KHz. These Data could be used in subsequent investigations on graphene spintronic transistors. Other works also support the development of wireless graphene nanotransceivers (Iannazzo-Soteras, ME 2017) or graphene-based biosensing transistors for biomedical use, connected via Bluetooth. (Arora, K. 2019).

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