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.

Friday, August 6, 2021

Graphene Oxide in Aviation Fuel

Reference
Li, JM; Chang, PH; Li, L .; Teo, CJ; Khoo, BC; Duan, H .; Mai, VC (2018). Application of Graphene Oxide in Jet A-1 in Air to Enhance Combustion Process. In 2018 AIAA Aerospace Sciences Meeting, pp. 133-138. https://doi.org/10.2514/6.2018-0133
Introduction

1. From the article on CO2 adsorption and adsorption capacity and specifically of the detail of the presence of graphene oxide in aerosols in the atmosphere, as a result of the incomplete combustion of jet aircraft (Pöschl, U. 2005), the investigation has been opened to the area of aviation fuels. This is due to the fact that the presence of graphene oxide in aerosols in the atmosphere can only be due to the air vector or due to contamination caused by the fuels used by jet engines, or due to the direct effect or practice of an intentional fumigation at high altitude. . It must be considered that fumigation at very low altitude, carried out by fumigation plans for the treatment of agricultural fields, should not influence the upper layers of the atmosphere, where the study of (Pöschl, U. 2005) was carried out.

2. On the other hand, the subject of the analyzed article " *Application of graphene oxide in Jet A-1 in air to improve the combustion process*", transfers some concepts that must be clarified. IN the first place the types of air fuel and in particular the Jet A-1 fuel. Usually the air fuel, also known as kerosene is a derivative of petroleum that has great calorific value, lubricating capacity, easily injectable in jet engine turbines and with a flash point of around 38ºC. Aviation fuels are classified according to civil or military use. Civilian fuel has three variants, namely Jet-A, Jet-A1 and Jet-B. Jet-A1 Fuel has a slightly lower freezing point (-47ºC) and a slight difference in energy density, compared to Jet-A fuel. Jet-B fuel includes additives that allow it to operate at colder temperatures, since its freezing point is -60ºC. In the military domain, there are the JP1-10 fuels whose additives have been changed in successive versions to improve the performance of the engines,reduce waste and facilitate the subsequent maintenance of the turbines.

Facts

1. The study by (Li, JM; Chang, PH; Li, L.; Teo, CJ; Khoo, BC; Duan, H.; Mai, VC 2018) clearly presents the application of graphene oxide "GO" as an additive of Jet -A1 aviation fuel, as indicated " *investigates the feasibility of applying graphene oxide (GO) nanofilms to Jet A-1 to improve its combustion performance in air, such as deflagration ignition delay, the speed of the flame and the reaction flow induced by the shock* ".

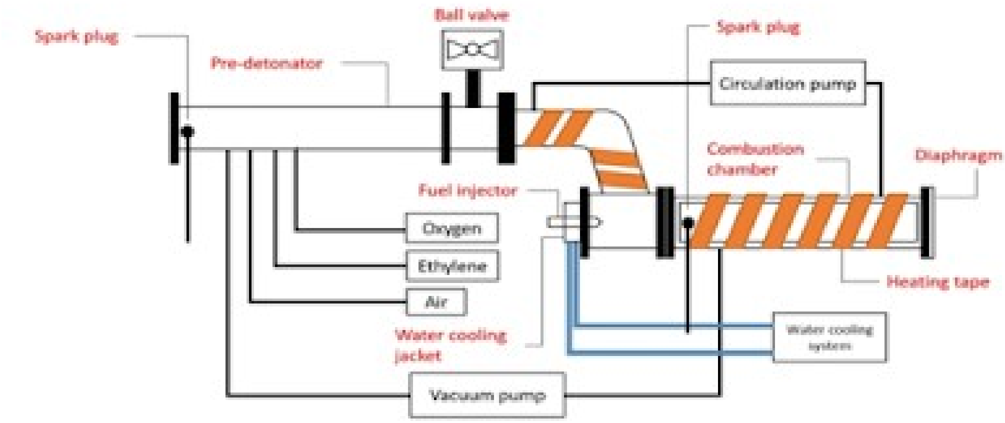

Fig. 1. Diagram of the high speed combustion experiment of GO-Jet-A1 fuel. (Li, JM; Chang, PH; Li, L.; Teo, CJ; Khoo, BC; Duan, H.; Mai, VC 2018)

2. In the authors' words, " *the results indicate that a longer Jet A-1 vaporization duration or a higher chamber temperature results in smaller and more densely wrinkled GO particles that retain a high surface area as a potential microcatalyst to enhance combustion reactions* ." This means that during the injection process of Jet-A1 fuel into the combustion chamber of the jet engine, it converts graphene oxide into particles that better adsorb the fuel, which favors the speed with which the ignition reaction is triggered. . This is stated as follows " *the initial deflagration test of the GO-Jet-A1 mixtures shows that the addition of GO nanofilts accelerates the initial linear combustion rate and reduces the ignition delay times* ." The data from the experiment show that "*for 17.9% of Jet A-1 fuel in air, the addition of GO in a proportion of (2mg / ml) increases the initial linear combustion rate from 4.52m / s to 5.15m / s (13.8%) and reduces the ignition delay times from 8.195 ms at 3,045ms (62.8%)* ". An extraordinary detail is that GO-Jet-A1 graphene oxide fuel" has photoignition properties and lower minimum ignition energy This is very relevant, since it is easier to detonate even with a pulse of energy emitted from a xenon flash chamber, making it an appropriate resource for solid rocket fuel. In fact, in the study they directly refer to This phenomenon is as follows: " *GO foam soaked in ethanol has shown that GO foam is capable of igniting ethanol vapor when lit with a xenon flash lamp* "

3. Another interesting detail is the " *possible inclusion of GO and / or metallic nanoparticles (for example, Fe, Au, Pt, Cu ...) in aviation fuels, which would pave another way to improve the transition from deflagration to detonation in a pulse motor* ". This statement is relevant because it means that the Fe3O4 nanoparticles with graphene oxide, already mentioned in the article on CO2 adsorption , are compatible with mixing in aviation fuels.

4. The authors conclude that the " *energy density of GO and its high reactivity associated with metallic nanoparticles, makes them unique fuel additives in propellant formulations, for significantly greater and faster energy release* ." In fact, they are not the only ones to study it.

Other studies

1. The work of (Askari, S.; Lotfi, R.; Rashidi, AM; Koolivand, H.; Koolivand-Salooki, M. 2016) also addresses the study of graphene oxide in the form of nanofluid, combined with kerosene, to determine the rheological, thermophysical and energy conservation properties. Curiously, graphene oxide nanoparticles combined with Fe3O4, coated with oleic acid and combined with kerosene, were used to carry out the experiment. The nanofluid obtained increased its viscosity, remaining more than five months without sedimentation. The maximum improvement in heat transfer was 66% with a weight increase of only 0.3% of the fuel.

2. Research on kerosene and graphene oxide additives continued in the work of (Askari, S.; Rashidi, A.; Koolivand, H. 2019) to determine the behavior of a fuel combined with MWCNT (Multi-Walled Carbon Nanotube) or what is the same multi-walled carbon nanotubes, which are essentially concentric graphene oxide nanotubes. Among the results, they observed an improvement in heat transfer by convection of 40.26%, noting the " *ultra*- stability " of the compound.

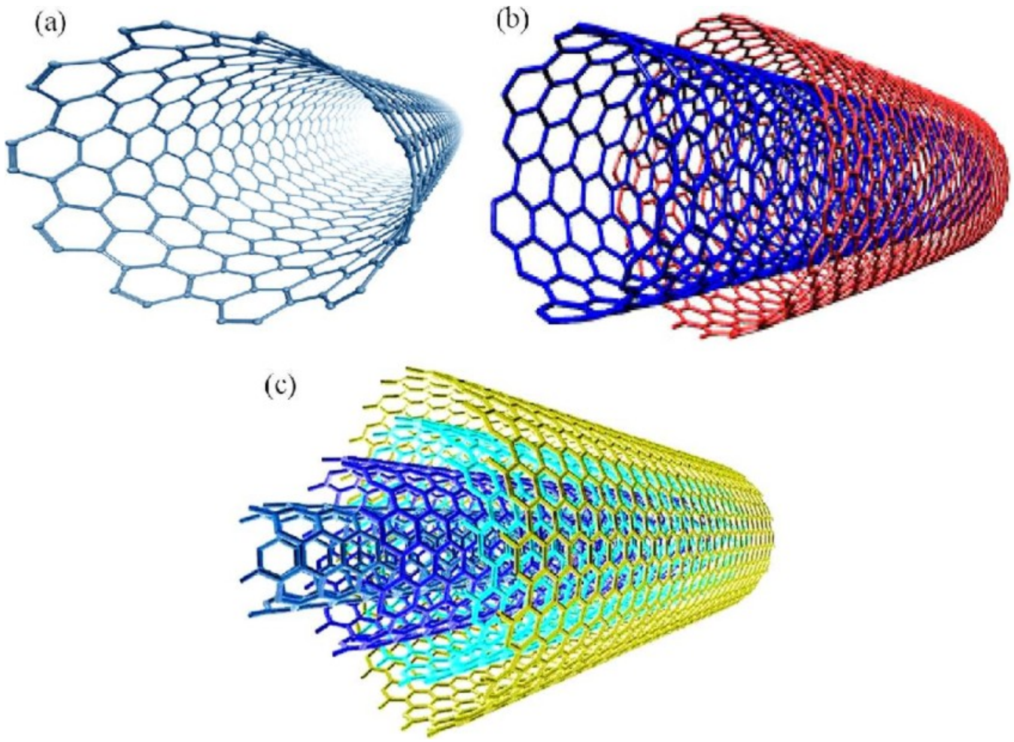

Fig. 2. Carbon nanotubes MWCNT in table c) obtained from the work of (Rafique, I.; Kausar, A.; Anwar, Z.; Muhammad, B. 2016)

Another study related to the MWCNT carbon nanotubes is that of (Khaled, M. 2015) which orients its application to the catalytic function of elimination of thiophene and dibenzothiophene in diesel fuel. Among their most relevant results, they obtain a 68.8% elimination of these compounds.

3. Research by (Agarwal, DK; Vaidyanathan, A.; Kumar, SS 2016) also addresses the use of kerosene-graphene nanofluids. In this case, the application of the fuel would be framed in the rocket engines. In addition to corroborating an improvement in combustion performance, an ideal property for these applications was found which is " *the regenerative cooling of semi-cryogenic rocket engines* ".
4. Work has also been done on graphene oxide additives for industrial fuels, in order to reduce sulfur oxide emissions, as explained by (Betiha, MA; Rabie, AM; Ahmed, HS; Abdelrahman, AA; El-Shahat, MF 2018). They state " *The oxidative desulfurization process using graphene oxide has attracted significant interest in removing sulfur from fuels* ." In addition, the researchers add " *The combustion of fossil fuels containing sulfur compounds emits some of the sulfur oxides that are considered to be a harmful influence on human health and the surrounding environment, as well as the economy* ." This statement is very surprising, considering the harmful effects of graphene oxide, which the authors do not seem to know. As a conclusion of their study they indicate that graphene oxide " *GO continues to be an ideal type of catalyst to obtain a pure fuel in the near future due to its eligible physicochemical characteristics* ".
5. Another example of air fuel is that of (Dai, Y.; Nie, G.; Gong, S.; Wang, L.; Pan, L.; Fang, Y.; Zou, JJ 2020) in which a low freezing point , high density, high calorific value and thermal stability of combustion. To do this, they take as a basis biofuels based on biomass (cellulose derivatives) combined with graphene oxide, so that the emulsification of the added reagents (cyclopentanol, methylcyclopentane and sulfuric acid) is improved. This resulted in a single tank blend, with a carbon yield of 83.2% and an improved performance over jet fuel by 97.3%.
6. Another example of graphene oxide in aviation fuel is the one proposed (Feng, M.; Jiang, XZ; Mao, Q.; Luo, KH; Hellier, P. 2019) to improve the oxidation of the propellant JP-10 with sheets of functionalized graphene. JP-10 is a fuel used in missiles, military jet engines, ramjets and scramjets, whose characteristics are high energy and calorific density, thermal stability and low freezing point. The researchers corroborate that " *graphene nanoplates perform outstandingly by producing a more than 7% increase in combustion rate with only 0.1% particle loading* ." In the discussion of their results they state that "*both the pyrolysis and oxidation of JP-10 advance and improve in the presence of FGS (Functionalized graphene sheets), which leads to an earlier decomposition of JP-10 at a lower temperature and a faster reaction rate* . "stating that" *this research lays the scientific foundation for the potential use of FGS as a promising catalyst for JP-10 fuel systems* . " These claims are also recognized by the study of (Yadav, AK; Nandakumar, K.; Srivastava, A.; Chowdhury, A. 2019).
7. Powdered graphene has also been combined with mesoscale aviation fuel (Huang, X.; Li, S. 2016). Mesoscale means that the ignition and combustion tests simulated atmospheric conditions. Among the findings and conclusions, they stand out that the nanometric graphene in the fuel remains stable for longer than in micrometer size, therefore, the smaller size tends to improve the mixture. Moreover " *l to liquid film jet fuel containing graphene powders can turn induction with short delay* ". It is also indicated that " *the combustion of graphene precedes the ignition of the vaporized fuel in the reactors* " and an important detail "*graphene serves as a nucleation point to accelerate the vaporization of jet fuel* "given its adsorption capacity, already analyzed in the capture of co2 and the nucleation of ice crystals .

Feedback

1. The use of graphene oxide in aviation fuels could explain the presence of graphene oxide in the atmosphere, together with soot as a result of incomplete pyrolysis in aircraft jet engines, as observed (Pöschl, U. 2005). In fact, all the scientific investigations consulted coincide in the improvement of the performance and qualities of aviation fuel, when graphene oxide additives and derivatives are added. Therefore, It can be stated that the result of the combustion or pyrolysis of aviation fuel can generate traces of graphene oxide (in addition to soot) in the form of chemtrails together with the water vapor obtained by the condensation of exhaust gases from the turbines of the jet aircraft from certain altitudes in the troposphere where the temperature is below freezing. As explained in the entry about thenucleation of ice crystals in graphene oxide nanoparticles , it would not be negligible to think that graphene oxide under conditions of temperature and humidity such as those found at the flight height of commercial aircraft, would cause the generation of clouds, which would explain the cloud seeding and a weather-modifying or geoengineering effect. It would also explain the presence of graphene oxide in the water droplets , as has been warned. All this would confirm the existence of chemtrails as a result of the residue from the combustion of kerosene and graphene oxide in jet engines of aviation (civil / military) and would suppose the evidence of contamination by air.
2. On the other hand, the great frequency of appearance of graphene oxide GO, combined with Fe_3O_4, has been observed. To the already known applications (CO_2 adsorption, DNA anticancer vaccines, biocides-fertilizers for agricultural use, absorption of 5G electromagnetic waves ...) is added the application in aviation fuels. This means that GO / Fe_3O_4 or Fe_3O_4 / GO could be the universal compound from which the origin of all the problems related to c0r0n @ v | rus derives.
   - DNA anticancer vaccines (Shah, MAA; He, N.; Li, Z.; Ali, Z.; Zhang, L. 2014)
   - Biocides and fertilizers (Zhang, M.; Gao, B.; Chen, J.; Li, Y.; Creamer, AE; Chen, H. 2014)
   - Absorption of 5G electromagnetic waves (Ma, E.; Li, J.; Zhao, N.; Liu, E.; He, C.; Shi, C. 2013)
   - CRISPR gene reformulated vaccines (bbott, TR; Dhamdhere, G.; Liu, Y.; Lin, X.; Goudy, L.; Zeng, L.; Qi, LS 2020)
   - Damage of graphene in the human body, see bibliographic repertoire and entries in this blog.
3. Finally, it remains to be determined to what extent it would be feasible to fumigate graphene oxide directly, in order to reduce CO_2 and collaborate in the fight against climate change. This point will be addressed in the next post.

Bibliography

1. Askari, S .; Lotfi, R .; Rashidi, AM; Koolivand, H .; Koolivand-Salooki, M. (2016). Rheological and thermophysical properties of ultra-stable kerosene-based Fe_3O_4 / Graphene nanofluids for energy conservation. Energy Conversion and Management, 128, pp. 134-144. https://doi.org/10.1016/j.enconman.2016.09.037
2. Askari, S .; Rashidi, A .; Koolivand, H. (2019). Experimental investigation on the thermal performance of ultra-stable kerosene-based MWCNTs and Graphene nanofluids. International Communications in Heat and Mass Transfer, 108, 104334. https://doi.org/10.1016/j.icheatmasstransfer.2019.104334
3. Agarwal, DK; Vaidyanathan, A .; Kumar, SS (2016).Experimental investigation on thermal performance of kerosene - graphene nanofluid. Experimental Thermal and Fluid Science, 71, pp. 126-137. https://doi.org/10.1016/j.expthermflusci.2015.10.028

4. Betiha, MA; Rabie, AM; Ahmed, HS; Abdelrahman, AA; El-Shahat, MF (2018). Oxidative desulfurization using graphene and its composites for fuel containing thiophene and its derivatives: An update review. Egyptian journal of petroleum, 27 (4), 715-730. https://doi.org/10.1016/j.ejpe.2017.10.006
5. Dai, Y .; Nie, G .; Gong, S .; Wang, L .; Pan, L .; Fang, Y .; Zou, JJ (2020). Reduced graphene oxide enhanced emulsification for one-pot synthesis of high-density jet fuel. Fuel, 275, 117962. https://doi.org/10.1016/j.fuel.2020.117962
6. Feng, M .; Jiang, XZ; Mao, Q .; Luo, KH; Hellier, P. (2019). Initiation mechanisms of enhanced pyrolysis and oxidation of JP-10 (exo-tetrahydrodicyclopentadiene) on functionalized graphene sheets: Insights from ReaxFF molecular dynamics simulations. Fuel, 254, 115643. https://doi.org/10.1016/j.fuel.2019.115643
7. Huang, X .; Li, S. (2016). Ignition and combustion characteristics of jet fuel liquid film containing graphene powders at meso-scale. Fuel, 177, pp. 113-122. https://doi.org/10.1016/j.fuel.2016.03.004
8. Khaled, M. (2015). Adsorption performance of multiwall carbon nanotubes and graphene oxide for removal of thiophene and dibenzothiophene from model diesel fuel. Research on Chemical Intermediates, 41 (12), pp. 9817-9833. http://dx.doi.org/10.1007%2Fs11164-015-1986-5
9. Pöschl, U. (2005). Atmospheric aerosols: composition, transformation, climate and health effects. Angewandte Chemie International Edition, 44 (46), pp. 7520-7540. https://doi.org/10.1002/anie.200501122
10. Rafique, I .; Kausar, A .; Anwar, Z .; Muhammad, B. (2016). Exploration of epoxy resins, hardening systems, and epoxy / carbon nanotube composite designed for high performance materials: A review. Polymer-Plastics Technology and Engineering, 55 (3), pp. 312-333. https://doi.org/10.1080/03602559.2015.1070874
11. Yadav, AK; Nandakumar, K .; Srivastava, A .; Chowdhury, A. (2019). Combustion of rocket-grade kerosene droplets loaded with graphene nanoplatelets - A search for reasons behind optimum mass loadings. Combustion and Flame, 203, pp. 1-13. https://doi.org/10.1016/j.combustflame.2019.01.030