The Novel Hyper-Combustion for the Complete Combustion of Fossil Fuels

Ruggero Maria Santilli

***Abstract*—The current combustion of fossil fuels is essentially the same as it was at the dawn of our civilization some fifty thousand years ago. In fact, we strike a spark and ignite the fuel, with increasingly alarming climactic changes due to the lack of complete combustion. In preceding works, the author achieved the complete combustion of the synthesized fuel known as *magnegas.* In this paper, we propose, apparently for the first time, new principles of combustion under the suggested name of *HyperCombustion* (patent pending) based on the recently achieved fusion of Carbon and Oxygen into Silicon without the release of harmful radiation, with ensuing significant increase of the energy output, the achievement of complete combustion, and the reduction of the green house gase CO_2 for a given energy output.**

***Index Terms*—Molecular combustion, magnecular combustion, hypercombustion.**

I. Introduction

Our increasingly alarming environmental problems (see, e.g., Fig. 1) are mostly due to the current combustion [1]-[6] of commercially available fossil fuels, such as gasoline, diesel or coal, which is essentially the same as it was at the dawn of our civilization some fifty thousand years ago. In fact, we essentially strike a spark and ignite the fuel, resulting in the release of excessive contaminants.

In this paper, we outline the studies on combustion by the author initiated in the late 1970’s while he was at Harvard University under support from the Department of Energy [7]-[72] and propose, apparently for the first time, basically new principles of combustion here submitted under the name of *HyperCombustion™* (patent pending) which aims at the achievement (in due time and following due investments) of a *complete combustion* of fossil fuels, hereon referred to as a combustion without combustible contaminants in the exhaust.

For this task, we identify in Section II the features of conventional combustion that are responsible for the indicated environmental problems; we then outline in Section 3 the novel magnecular combustion that has already achieved the indicated complete combustion for the gaseous fuel magnegas; we introduce in Section IV the principles and available experimental evidence of HyperCombustion offering realistic possibilities of extending to fossil fuels the complete combustion already achieved by magnegas; and we close the paper with expected environmental implications of HyperCombustion and open problems.

Fig. 1. A view of the atmospheric pollution in Beijing, China, on a sunny day.

II. Molecular Combustion

The terms *molecular combustion* are hereon referred to as the current combustion of fuels with conventional molecular structure (Fig. 2), thus being composed by atoms such as carbon C, hydrogen H and other elements bonded together by the conventional valence bond (alternatively called covalence bond) which is hereon indicated with the symbol “–.” Well known examples (see Refs. [1]-[5] are given by the combustion of hydrogen and oxygen]

$$H - H + \frac{1}{2} O - O \rightarrow H - O - H \ + \ 57.5 kcal/mol. \quad (1)$$

that of carbon and oxygen symbol

$$C + \frac{1}{2} O - O \rightarrow CO \ + \ 25 kcal/mole \quad (2)$$

and others [1]-[6].

Note that, according to our definition, combustion (1) is “complete” (because H_2O is not combustible), while combustion (2) is “incomplete” (because CO is combustible). In this study, we also assume, for simplicity, that we have the perfect stochiometric ratio between fuel and oxygen to prevent the incompleteness of otherwise complete reactions, such as (1).

In the author’s view and experience, despite advances that are clearly historical [6], the achievement of a full combustion of commercially available fossil fuels requires the identification and resolution of the following open

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problems of quantum chemistry with particular reference to its treatment of combustion (see, e.g., Section II of Ref. [16]):

2.1. The 20th century notion of "valence bond" is merely conceptual due to the lack of a quantitative identification of the bonding force because *two identical valence electrons must repel, and certainly not attract each other according to quantum mechanics and chemistry since they have the same charge.* The ensuing lack of a quantitative representation of the "molecules." then clearly prevents basic advances in the combustion of fossil fuels.

2.2. As it is well known, all combustions are irreversible over time, while quantum mechanics and chemistry are strictly reversible over time from their axioms and dynamical equations. Consequently, quantum mechanics and chemistry are only approximately valid for a quantitative treatment of combustion. The lack of axiomatically and dynamically correct formulations for irreversible chemical reactions is an evident additional limitation for the improvement of combustion since it does not allow reliable theoretical predictions.

2.3. Due to their local-differential mathematical structure, quantum mechanics and chemistry can only represent energy releasing chemical reactions as occurring in between point-like molecules solely under action-at-a-distance potential interactions. In fact, said theories cannot represent non-linear, non-local and non-potential interactions expected in all energy releasing processes, which broader interactions were assumed by Lagrange and Hamilton to be necessary for the representation of nature and were represented via external terms in their celebrated equations that are absent in 20th century sciences.

Additiionally, despite a century of studies, we remain with ambiguities in the presentation and treatment of the energy released by basic combustions, such as (1) [2]-[4] whose resolution, as we shall see, is important for the achievement of the complete combustion of fossil fuels. Consider, as an example, the widespread statement that combustion (1) produces $57.5\ kcal/mole$. However, as evident from the structure of water $H - O - H$, a necessary condition for combustion (1) is that the hydrogen and oxygen "molecules" are separated into "atoms" requiring $104.2\ kcal/mole$ and $119.1/2 = 59.5\ kcal/mole$. Consequently, in order not to violate the conservation of energy, the energy output of combustion (1) should be

$$104.2_{Hsep} + 59.5_{Osep} + 57.5 = 163.7_{mp\text{-}sep} + 57.5 = 221.2 Kcal/mole\backslash \quad (3)$$

The author initiated his studies of the complete combustion of fossil fuels with the first and only known quantitative identification of *attractive force in valence coupling* thanks to the prior construction of the novel *isomathematics* [7]-[9] for the representation of non-linear, non-local and non-Hamiltonian interactions in total mutual penetrations of wavepackets, with ensuing *isomechanics* [10], [11] and *isochemistry* [12]. The resulting attractive valence force, known as *Santilli isovalence bond* [p.12], resulted to be so strong to overcome the repulsive Coulomb force as well as permit the first known *exact* representation of the binding energies and other data of the hydrogen [13] and water [14] molecule.

Fig. 2. An illustration of the fact that the current combustion of fossil fuels is the same as it was at the dawn of civilization.

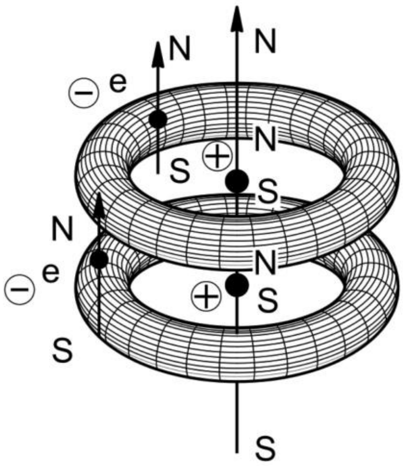


Fig. 3. A view of the basic magnecule between Carbon and Oxygen which is at the basis of the new combustion.

Despite the achievement of an attractive valence force, isoformulations remained reversible over time in both their axioms and dynamical equations because it is necessary to represent the reversibility over time of isolated molecules. In order to achieve a resolution of irreversible chemical reactions, the author had no other choice than to build broader formulations for the vresolution of insufficiencies 2.1, 2.2 and 2.3, including the covering *genomathematics* [7]-[9] embedding irreversibility in the most basic operations, such as ordered products and units, with ensuing *genomechanics* [10], [11] and *genochemistry* [12]. The axiomatic and dynamical consistency of the broader genoformulations was proved in Refs. [15], [16].

Unfortunately, we have no possibility of even outlining these above isotopic and genotopic formulations to prevent a prohibitive length. Nevertheless, their knowledge is essential for a true understanding of the HyperCombustion presented in Section IV. A recent general review by the author is provided in Sections II and III of Ref. [16], independent studies are available from monographs [17]-[20], while a general independent review is available in Ref. [21].

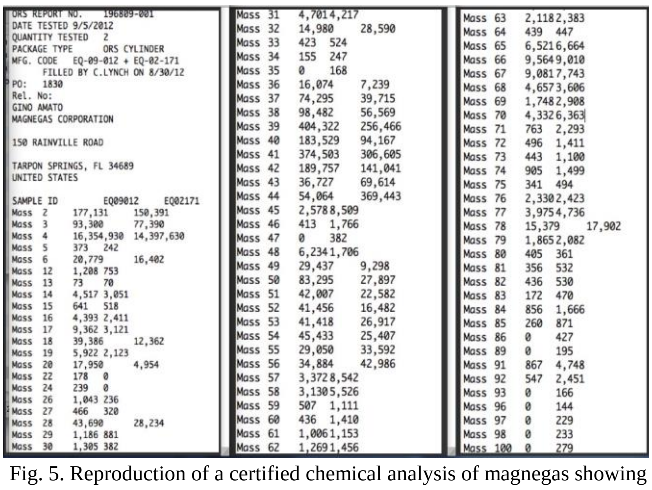
III. Magnecular Combustion

According to the studies outlined in the preceding sections, the inability of commercially available fossil fuels to achieve a complete combustion is due to: the strength of valence bonds that cannot be entirely broken under the released energies; the combustion temperature which is insufficient to infinite combustible contaminants in the exhaust; and otherfactors.

Fig. 4. view of the gasifiers built by the author when Chief Scientist of Magnegas Corporation converting liquids into the clean burning magnegas fuel.

Following, and only following, the identification of the actual attractive force in valence bonds a related quantitative representation of molecular structures [7]-[12], the author initiated in the 1990's the search of means to *weaken* valence bonds because in the evident hope of improving the currently available combustions. Following a number of unpublished trials and errors, the author had no other choice than that of working out a *new chemical species* with a bond *weaker* than the valence bond.

Following a decade of research, the author reported in Ref. [22] of 1998 (see also the comprehensive treatment in monograph [21] of 2001) mathematical, theoretical and experimental evidence suggesting the existence of a new chemical species structurally different than that of molecule, today known as *Santilli magnecules* [21] which consists of atoms H, C, O, etc., dimers C-H, H-O, etc, and ordinary molecules H-H, C-O, etc. bonded together by opposing polarities of toroid configurations of atomic electrons achieved under suitably strong magnetic fields [23] (see Figure 3 for a view of the "elementary magnecule").



ORS REPORT NO. 196809-001
DATE TESTED 9/5/2012
QUANTITY TESTED 2
PACKAGE TYPE ORS CYLINDER
MFG. CODE EQ-09-012 + EQ-02-171
FILLED BY C.LYNCH ON 8/30/12
PO: 1830
Rel. No:
GINO AMATO
MAGNEGAS CORPORATION

150 RAINVILLE ROAD

TARPON SPRINGS, FL 34689
UNITED STATES

SAMPLE ID	EQ09012	EQ02171
Mass 2	177,131	150,391
Mass 3	93,300	77,390
Mass 4	16,354,930	14,397,630
Mass 5	373	242
Mass 6	20,779	16,402
Mass 12	1,208	753
Mass 13	73	70
Mass 14	4,517	3,051
Mass 15	641	518
Mass 16	4,393	2,411
Mass 17	9,362	3,121
Mass 18	39,386	12,362
Mass 19	5,922	2,123
Mass 20	17,950	4,954
Mass 22	178	0
Mass 24	239	0
Mass 26	1,043	236
Mass 27	466	320
Mass 28	43,690	28,234
Mass 29	1,186	881
Mass 30	1,305	382
Mass 31	4,701	4,217
Mass 32	14,980	28,590
Mass 33	423	524
Mass 34	155	247
Mass 35	0	168
Mass 36	16,074	7,239
Mass 37	74,295	39,715
Mass 38	98,482	56,569
Mass 39	404,322	256,466
Mass 40	183,529	94,167
Mass 41	374,503	306,605
Mass 42	189,757	141,041
Mass 43	36,727	69,614
Mass 44	54,064	369,443
Mass 45	2,578	8,509
Mass 46	413	1,766
Mass 47	0	382
Mass 48	6,234	1,706
Mass 49	29,437	9,298
Mass 50	83,295	27,897
Mass 51	42,007	22,582
Mass 52	41,456	16,482
Mass 53	41,418	26,917
Mass 54	45,433	25,407
Mass 55	29,050	33,592
Mass 56	34,884	42,986
Mass 57	3,372	8,542
Mass 58	3,130	5,526
Mass 59	507	1,111
Mass 60	436	1,410
Mass 61	1,006	1,153
Mass 62	1,269	1,456
Mass 63	2,118	2,383
Mass 64	439	447
Mass 65	6,521	6,664
Mass 66	9,564	9,010
Mass 67	9,081	7,743
Mass 68	4,657	3,606
Mass 69	1,748	2,908
Mass 70	4,332	6,363
Mass 71	763	2,293
Mass 72	496	1,411
Mass 73	443	1,100
Mass 74	905	1,499
Mass 75	341	494
Mass 76	2,330	2,423
Mass 77	3,975	4,736
Mass 78	15,379	17,902
Mass 79	1,865	2,082
Mass 80	405	361
Mass 81	356	532
Mass 82	436	530
Mass 83	172	470
Mass 84	856	1,666
Mass 85	260	871
Mass 86	0	427
Mass 89	0	195
Mass 91	867	4,748
Mass 92	547	2,451
Mass 93	0	166
Mass 96	0	144
Mass 97	0	229
Mass 98	0	233
Mass 100	0	279

Fig. 5. Reproduction of a certified chemical analysis of magnegas showing the presence of constituents from 2 to hundreds of amu.

From 2007 to 2012, in his capacity of Chief Scientist of the publicly traded company *Magnegas Corporation* (www.magnegas.com), the author constructed reactors (see an example in Fig. 4) converting liquids into a gaseous fuel known as *magnegas*. Since the gasification process was done via a submerged DC electric arc, it had to have the necessary strength for the toroid polarization of atomic electrons. Said polarizations evidently disappear at the disconnection of the arc. Nevertheless, pairs of polarized and coupled atoms as in Fig. 4 retain their bond at ambient temperature, thus having the stability necessary for industrial applications. In this way, the author identified a number of fuels with a magnecular structure covered by U. S. Patent 9,700,870, B2 [24], including: magnegas (MG) [25]; magnehydrogen (MH) and magneoxygen (MO) [26]; a new gaseous form of water (HHO) [27]; and other magnecular gases [28].

According to the above studies, under condition of polarization MG is composed by a collection of magnecules here referred to as clusters with magnecular bonds of all atoms, hereon denoted "×" that can be symbolically represented with the structure

$$MG = \{H \times H + H - H \times H + H \times H \times H + C - O \times H + \ldots\ldots\}. \quad (4)$$

The above chemical structure has been confirmed by various tests, such as the measurements conducted at *ONEIDA Research Services* of Whitesboro, New York, via methods.

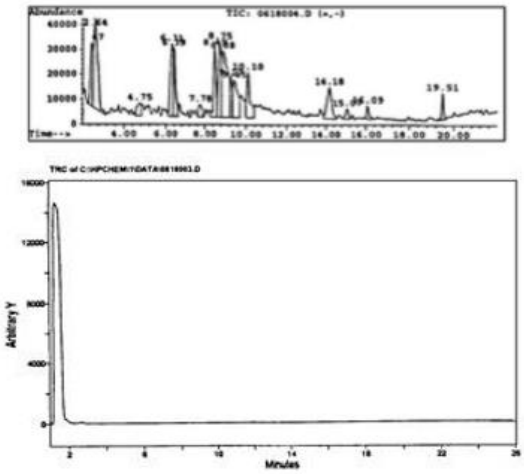
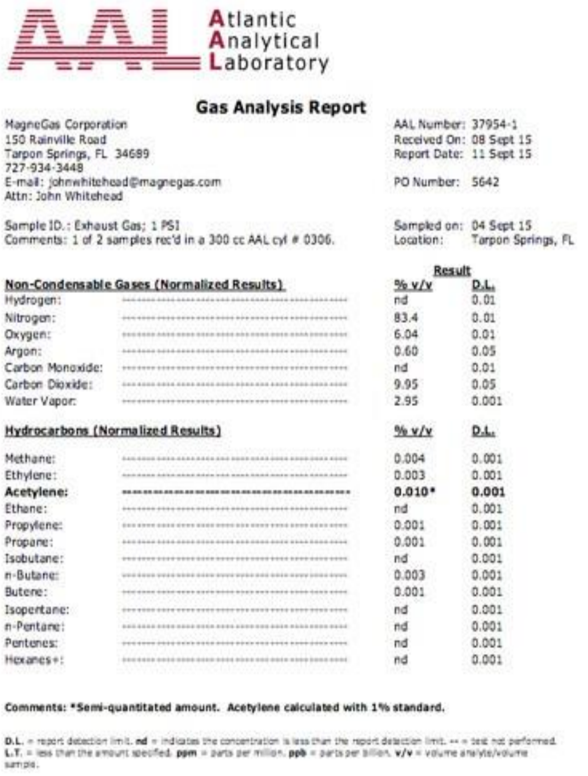


Fig. 6. A view of the first experimental detection of magnecules showing in the top the clusters obtained via a gas chromatographer, mass spectrometer, and in the bottom the lack of detection via an infrared detector thus confirming that the former cannot be molecules.

ORS SOP MEL-1070: Gas Analysis [29] (see Fig. 5 for a summary). These measurements show that MG is composed by clusters from 2 to 200 *amu*, of course, with different concentrations, thus confirming magnecular structure (4). Note that measurements [29] (Fig. 5) cannot be credibly explained by assuming that MG has a conventional molecular structure.

In addition to the original experimental evidence presented in the author's proposal [12], [22], the existence of magnecules has been confirmed by a number of independent tests [30]-[33] (see also Refs. [34]-[28]). These detections generally turned out to be of difficult understanding by laboratory analysts because they attempt the detection of the new chemical species of magnecules with equipment, such as gas chromatographer mass spectrometers (GC-MS), that has been specifically designed for molecules. This is due to the fact that magnecules have a bond estimated to be $1/10th$ that of a molecule. As a consequence, ionization means in GC-MS that are so effective for the detection of molecule, generally destroys the magnecular species they have to detect, reduce them to their conventional molecular components, thus showing the apparent lack of new species.



Atlantic Analytical Laboratory

Gas Analysis Report

MagneGas Corporation
150 Rainville Road
Tarpon Springs, FL 34689
727-934-3448
E-mail: johnwhitehead@magnegas.com
Attn: John Whitehead

AAL Number: 37954-1
Received On: 08 Sept 15
Report Date: 11 Sept 15

PO Number: 5642

Sample ID.: Exhaust Gas; 1 PSI
Comments: 1 of 2 samples rec'd in a 300 cc AAL cyl # 0306.

Sampled on: 04 Sept 15
Location: Tarpon Springs, FL

Non-Condensable Gases (Normalized Results)	Result % v/v	D.L.
Hydrogen:	nd	0.01
Nitrogen:	83.4	0.01
Oxygen:	6.04	0.01
Argon:	0.60	0.05
Carbon Monoxide:	nd	0.01
Carbon Dioxide:	9.95	0.05
Water Vapor:	2.95	0.001

Hydrocarbons (Normalized Results)	% v/v	D.L.
Methane:	0.004	0.001
Ethylene:	0.003	0.001
Acetylene:	**0.010***	**0.001**
Ethane:	nd	0.001
Propylene:	0.001	0.001
Propane:	0.001	0.001
Isobutane:	nd	0.001
n-Butane:	0.003	0.001
Butene:	0.001	0.001
Isopentane:	nd	0.001
n-Pentane:	nd	0.001
Pentenes:	nd	0.001
Hexanes+:	nd	0.001

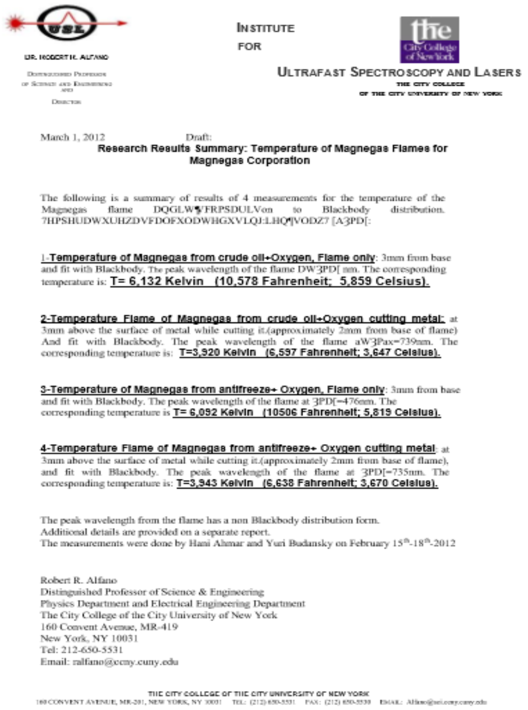
Comments: *Semi-quantitated amount. Acetylene calculated with 1% standard.

D.L. = report detection limit. **nd** = indicates the concentration is less than the report detection limit. -- = test not performed. **L.T.** = less than the amount specified. **ppm** = parts per million. **ppb** = parts per billion. **v/v** = volume analyte/volume sample.

Fig. 7. Chemical analysis of magnegas exhaust by Atlantic Analytic Laboratories showing the absence of carbon monoxide (as ND) and small traces of hydrocarbons.

Since new detectors specifically designed for magnecules are not available at the moment, the only known experimental detection of magnecules remains that of original proposal [22], consisting in an indirect detection via the use of a GC-MS equipped with an infrared detector (GC-MS/IRD). The same sample of gas is first inspected in the GC-MS operated at the minimal possible temperature, ionization energy and other settings, resulting in the identification of the clusters composing the gas. The same sample is then analyzed with the IRD. In the event the IRD confirms the existence of the clusters from the identified by the GC-MS (top view) had a signature under the IRD, thus prohibiting the clusters in the GC-MS to have a molecular structure. Note that CO_2 is detected in the IRD (Bottom left of Fig. 6) but not present in the GC-MS detections (top of Fig. 6), thus establishing that CO_2 is a *constituent* of the magnecular clusters. All subsequent detections [30]-[38] essentially provide a confirmation of said original detections.

GC-MS at their amu, said clusters are conventional molecules. By contrast, in the event the IRD shows no signature at the amu values of the GC-MS clusters, said clusters cannot possibly be molecules due to their lack of resonating frequency. In Fig. 6 we reproduce the original detections of Ref. [22]. As one can see, none of the clusters



DR. ROBERT R. ALFANO
DISTINGUISHED PROFESSOR OF SCIENCE AND ENGINEERING AND DIRECTOR

INSTITUTE FOR ULTRAFAST SPECTROSCOPY AND LASERS
THE CITY COLLEGE OF THE CITY UNIVERSITY OF NEW YORK

March 1, 2012 Draft:

Research Results Summary: Temperature of Magnegas Flames for Magnegas Corporation

The following is a summary of results of 4 measurements for the temperature of the Magnegas flame DQGLW¶VFRPSDULVon to Blackbody distribution. 7HPSHUDWXUHZDVFDOFXODWHGXVLQJ:LHQ¶VODZ7 [A3PD[:

1-**Temperature of Magnegas from crude oil+Oxygen, Flame only**: 3mm from base and fit with Blackbody. The peak wavelength of the flame DW3PD[nm. The corresponding temperature is: **T= 6,132 Kelvin (10,578 Fahrenheit; 5,859 Celsius).**

2-Temperature Flame of Magnegas from crude oil+Oxygen cutting metal: at 3mm above the surface of metal while cutting it.(approximately 2mm from base of flame) And fit with Blackbody. The peak wavelength of the flame aW3Pax=739nm. The corresponding temperature is: **T=3,920 Kelvin (6,597 Fahrenheit; 3,647 Celsius).**

3-Temperature of Magnegas from antifreeze+ Oxygen, Flame only: 3mm from base and fit with Blackbody. The peak wavelength of the flame at 3PD[=476nm. The corresponding temperature is **T= 6,092 Kelvin (10506 Fahrenheit; 5,819 Celsius).**

4-Temperature Flame of Magnegas from antifreeze+ Oxygen cutting metal: at 3mm above the surface of metal while cutting it.(approximately 2mm from base of flame), and fit with Blackbody. The peak wavelength of the flame at 3PD[=735nm. The corresponding temperature is: **T=3,943 Kelvin (6,638 Fahrenheit; 3,670 Celsius).**

The peak wavelength from the flame has a non Blackbody distribution form.
Additional details are provided on a separate report.
The measurements were done by Hani Ahmar and Yuri Budansky on February 15th-18th-2012

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Fig. 8. Spectroscopic analysis of magnegas flame showing a temperature which is about three times that of any other commercially available fue.

Fig. 9. A view of stock cars operated by the author with magnegas without catalytic converter wssing EPA requirements due to the quality of the exhaust shown in Figurehile surpa 7.

The interested reader should be informed that, since the date of Ref. [22] (1998), GCMS and IRD detectors have considerably increased the rapidity of the analyses evidently via the increase of the ionization energy and other advances. While such increases have no effect for magnecules, they evidently *decrease* the capability of identifying magnecular clusters. In fact, the original detections of magnecules were done via the analytic laboratories of McClellan Air Force Base near Sacramento, CA, via a GC-MS/IRD comprising of a HP GC model 5890, a HP MS model 5972 and a HP IRD model 5965. During the independent tests [30]-[33], the analysts failed to reproduce with modern GC-MS the cluster of MG identified so clearly with the indicated GC-MS, again due to the excessive increase of the ionization energy and other settings in contemporary GC-MS, thus forcing the experimentalists to recondition an old HP GC model 5890, a HP MS model 5972 and a HP IRD model 5965.

Fig. 10. View of ta prototype of the new hyperfurnaces.

A first feature of magnegas which is important for environmental aspects is that, as typically the case for all magnetic effects and related Curie Temperature, *magnecular bonds disappear at combustion, thus preventing the loss of separation energies of type (3), with ensuing enhancement of energy output.* In fact, MG cuts metal faster than acetylene with 2,400 *BTU/scf*, while having a nominal 320 *BTU/scf* according to standard GC-MS calculations.

The second environmentally important feature of magnegas is that, according to measurements conducted by the Ultra-Fast Spectroscopic Laboratory of the City College of New York [39], [40], *the flame temperature of magnegas is also three times the flame temperature of commercially available fuels, including fossil fuels* (see the summary table of Fig. 7.

The third environmentally important feature is that, under the correct stochiometric ration and MDS Ignition System, *magnegas does indeed achieve complete combustion.* In fact, according to analyses conducted by Atlantic Analytic Laboratories [41], *the combustion of magnegas in air under correct stochiometric ratio MG.O*)2 *and ignition, shows no detectable CO and no appreciable HC* (see the summary table in Fig. 8). Needless to say, under an improper stochiometric system or insufficient voltage or energy of the ignition, magnegas combustion cannot be complete.

In view of the above features, when he was Chief Scientist of Magnegas Corporation, the author was driving various stock cars produced to run on natural gas (NG) but operated with MG. These cars *surpassed all EPA regulations without catalytic converters.* Note that the above three anomalies establish the magnecular structure of magnegas since the same anomalies admit no quantitative representation via the conventional molecular species.

Sample ID	%Na	%Al	%Si	%S	%Cl	%K	%Ca	%Ti
8.23.13.A x	0.55	0.015	0.024	0.010	0.015	0.005	0.006	0.001
8.23.13.A (-)	0.44	0.11	0.47	0.028	--	0.006	0.041	0.002
8.23.13.A (+)	0.30	0.020	0.15	0.014	--	--	0.013	--

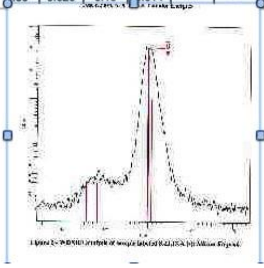

Fig. 11. A view of the certified analysis by Constellation Laboratories s establishing experimental evidence of the central process of the new hypercombustion, I.e., the nuclear fusion of Carbon-12 and Oxygen-16 into Silicon-28.

The above results signaled the achievement by the author of the intended environmental advance. Therefore, the author left Magnegas Corporation for the U. S., publicly traded company Thunder Energies Corporation for the extension of the above results to fossil fuels as described in the next section.

IV. HyperCombustion

In this section we submit, apparently for the first time, the possible extension of the complete combustion of magnecular fuels of Section III to commercially available fossil fuels (such as gasoline, diesel or coal) under the name of *HyperCombustion,* (patent pending) via the following main new principles:

PRINCIPLE 4,1: Ignite fossil fuels with a series of rapid DC discharges, each having at least 100 kV and at least 100 J, hereon called HyperSparks.

PRINCIPLE 4.2: Convert fossil fuels from their natural molecular structure to a magnecular form,

PRINCIPLE 4,3: Enhance the combustion temperature, magnecular conversion and the energy output vie the fusion of Carbon-12 and Oxygen-16 into Silicon-28

$$C(6,12,0,12.0000000) + +O(8,16,0,15.9949146) \rightarrow Si(14,28,0,27.9769265) \quad (5)$$

$$\Delta E = 0{,}0179881 amu = 16.75591515 MeV/c^2 \quad (6)$$

as well as other nuclear fusions, engineered according to the laws of Intermediate Controlled Nuclear Fusions (ICNF) without the emission of harmful radiations and without the release of radioactive waste (see Refs. [42]-[51] for theoretical treatments, Refs. [52]-[60] for independent studies, Refs. [61]-[72] for laboratory report, and Ref. [49] for the synthesis of Silicon, Fig. 10 for an ICNF reactor, Ref. [50] for a DVD on its operation, and Ref. [51] for its sound).

Principle 4,1 is crucial for the achievement of a combustion temperature necessary for a complete combustion as well as for molecular separation and atomic ionization, and from the triggering of ICNF. Principle 4.2, which can be also engineered the highly efficient magnegas reactors, is crucial for the reduction of energy lost in molecular separation, e.g., the lost energy of 163.7 *Kcal/mole* of Eq. (3). Principle 4.3 is crucial for the enhancement of all preceding processes, as well as for he increase of the energy output compared to that of conventional combustion of the same fuel.

The equipment implementing the above principles is here submitted under the name of *HyperFurnaces* (see Figure 10 for a prototype and Ref. [50], [51] for short DVD on its operation). In its expected industrial realization, HyperFurnaces are expected to include ceramic realization of the *hadronic reactors* of IUCNF essentially converting the correct mixture of fossil fuel and air into a high temperature exhaust without combustible contaminants via a number of equipment including: computerized stochiometric ration of fuel and air; exchangers for the desired use of the heath, such as for household radiators or electric generators; a processing station for cooled down exhaust prior to its release in the environment; and overall shield for electromagnetic and other radiations; and other equipment.

Special *R&D* is recommended for the station treating the exhaust for its safe release to the environment. Said exhaust is expected to contain primarily CO_2, but also other inert gases as well as solid particulates. The current, increasingly alarming environmental changes suggest the investment of all the necessary funds for the development of such a processing station via molecular separation or the processes so that no harmful gas is released in appreciable quantities.

It is evident that the production of the greenhouse gas CO_2 *increases* under complete combustion due to the combustion of CO, HC and other contaminants. However, the percentage of CO_2 per energy output is considerably *decreased* in HyperFurnaces due to the fusion of C-12 and O-16 into Si-28 that produce no CO_2 (see Ref. [49] and Fig. 11).

V. Concluding Remarks

In this paper we have submitted, apparently for the first time, a basically new combustion under the suggested name of *HyperCombustion,* essentially consisting in the enhancement of the energy output of fossil fuels combustion via the fusion of C-12 and O-16 into Si-28 without harmful radiation, which fusion has been recently achieved via the *hadronic reactors (see Fig. 10 for a prototype)* of *Intermediate Controlled Nuclear Fusions* (ICNF) (see Refs. [7]-[72] in general, Ref. [49] in particular, and Fig. 11 for a summary of independent measurements).

In case funding is made available for its proper development, HyperCombustion would achieve a complete combustion of fossil fuels with a significant reduction of our current environmental problems. Since ICNF releases no contaminants in the environment, HyperCombustion would additionally achieve a significant reduction of the green house gas CO_2 for a given energy output compared to their current combustion with the same energy output. The additional problem of CO_2 separation and recycling in an environmentally acceptable form, which is expected to mandate investments of the order of billions of dollars, has been identified but not addressed in this paper because requiring separate studies.

In closing, let us recall the lack of achievement of new clean nuclear or other energies in the past seventy years of research despite the use of bllions of dollars of public funds. The studies reported in this paper [7]-[72] establish that our alarming environmental problems cannot be solved with 20th century sciences, and require basically new mathematics, physics and chemistry.

This is due to the fact that 20th century sciences, including Einstein's theories, quantum mechanics and quantum chemistry, were conceived for, and are solely applicable to systems reversible over time (such as the hydrogen atom, particles in accelerators, etc.), while all energy releasing processes are irreversible over time, in addition to other structural insufficiencies (Section II) requiring the surpassing of 20th century theories in favor of suitable covering theories.

Therefore, in the author's view and experience, the inability by our society to solve alarming environmental problems is primarily due to the suppression of scientific democracy for qualified inquiries orchestrated by the academic-governmental complex.

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