Has nanothermite been oversold to the 9/11 Truth community?

"It's not what we don't know that hurts us, it's what we know that ain't so." – Will Rogers

Architects & Engineers for 9/11 Truth are heavily promoting the theory that "explosive nanothermite" was used to bring down the Twin Towers on September 11th, 2001, and that microscopic chips of a fused compound containing unignited nanothermite were found in the World Trade Center dust. This discovery is now considered a "smoking gun" by most members of the 9/11 Truth community, even though a good many serious researchers and 9/11 activists remain unconvinced.

Let's take a look at what is supposed to be the current best evidence in the controlled-demolition theory of the World Trade Center's tallest buildings. Steven Jones, a physicist who joined the 9/11 Truth movement from Brigham Young University during 2005, introduced the theory that thermite/thermate played a role in the destruction of the towers; and in 2007, he refined this theory to propose that nanothermite or "superthermite" – a finely granulated form of thermite – was in fact the substance used, and its high reactivity served to pulverize the steel, concrete and many additional tons of skyscraper material, including the buildings' contents.

In an effort to confirm the claims being made about thermite and nanothermite, T. Mark Hightower, a chemical engineer from both the space program and chemical industry, decided to investigate its use as an explosive. In addition to doing his own study, he has repeatedly written to leading 9/11 researchers who champion the use of nanothermite as the principal (if not exclusive) mechanism for bringing about the destruction of the Twin Towers, probing them on the explosive capabilities of nanothermite. The replies he has received suggest that this is an issue they are unwilling to examine fully and openly.

Hightower wrote directly to Richard Gage, the founder of Architects and Engineers for 9/11 Truth, citing a frequently-referenced March 2005 LLNL paper on thermite, which can be downloaded from the Reference 2 link at the bottom of http://911research.wtc7.net/wtc/analysis/theories/thermitetech.html
This paper explains what nano-composites are, focusing on thermite mixtures and how they are produced. It also includes some experimental results.

As Hightower observed to Gage, however: "This paper offers no evidence to me that explosive velocities anywhere near that of TNT (22,600 feet per second) can be produced by the nanothermites as described and presented. On page 10, it states, 'One limitation inherent in any thermite energetic material is the inability of the energetic material to do pressure/volume work on an object. Thermites release energy in the form of heat and light, but are unable to move objects.'"

What Hightower was asking Gage was: "How can a substance be an explosive and not be able to do pressure/volume work on an object – that is, move an object?" Gage responded: "The nanothermite was set in a bed of organic silica, which I believe the authors suggest may provide the explosive pressure/volume work. In addition, I believe that the authors are quite open to the possibility that other more high-energy explosives may have been used."

Without further characterization, the "bed of organic silica" is not a sufficient explanation, so the possibility is raised that "other more high-energy explosives may have been used." Surely thermite or nanothermite would become explosive if combined with bona fide explosives. Hightower decided to take an even closer look at the claims advanced on behalf of nanothermite, and has spent several months researching everything he could find in the open literature. Again and again, he found that thermite, even in its nano form, unless combined with high explosives or another high-explosive mechanism, cannot be a high explosive.

So if nanothermite is to be the "smoking gun" of 9/11, it would have had to have been combined with some form of high-power explosives or other high-explosive mechanism to do the job of bringing the buildings down. *What was it combined with?* By itself, nanothermite cannot have been the sole agent of demolition – it was only another "helper." By itself, therefore, nanothermite cannot be "explosive evidence," as

AE911 Truth maintains.

There are reasons to believe that the 9/11 movement's nanothermite experts are actually aware of this problem. For example, during a recent interview ("9/11: Explosive Testimony Exclusive" http://www.youtube.com/watch?v=0lU-vu2JvZY), Niels Harrit explains that nanothermite is built from the atom scale up, which allows for the option of adding other chemicals to make it explosive. He states that the role played by the red-gray chips found in the dust is unknown. But he is convinced, based on observation of the towers' destruction and the molten metal present, that both explosives and incendiaries were used. It's just that he and his fellow researchers *have not been able to prove that the nanothermitic material they found in the dust has the explosive properties* he believes were necessary to accomplish the destruction.

Harrit suggests the use of "a modern military material which is unknown to the general public" as an explanation for the missing pieces to the 9/11 nanothermite puzzle. He urges a new investigation, whereby NIST will test WTC dust samples for remaining explosives and thermitic material. But he also seems to be saying that he and his fellow 9/11 researchers do not consider it worthwhile to pursue further analysis beyond their current findings.

9/11 truthers may agree that (1) if unignited nanothermite was in the WTC dust after the event, it proves a demolition plan of some kind; or (2) if unignited nanothermite was found in the dust after the event, it only proves that nanothermite played some role either on 9/11 or in its aftermath – including the cleanup, which was overseen by the federal and city governments. Those who believe (1) may in fact be satisfied with the *lack of conclusive evidence of explosives* the discovery of nanothermite presents. Those who agree with (2) are most likely to be unsatisfied by the current state of affairs, and may indeed argue, "We still have no real 'hard evidence' proving that the Twin Towers were brought down by explosives."

We do have visual evidence (videos) that strongly indicate to any discerning viewer that the Twin Towers did not come down by gravitational collapse. However, apart from that, we are still where we started – pursuing different inquiries into how and why the buildings fell the way they did. "Explosive nanothermite" is no firmer a theory than conventional explosives demolition, nuclear demolition, or directed free-energy technology; in fact, it is somewhat misleading and – for that reason alone – probably not the best horse for us to be betting on.

HOW INDEED CAN NANOTHERMITE BE EXPLOSIVE?
& THE NANOTHERMITE CHALLENGE

T Mark Hightower, B.S., M.S., Chemical Engineering

INTRODUCTION

This paper explores the explosiveness of nanothermite.

Steven E. Jones made the error early in his research, of classifying nanothermite as an explosive in the same category as the high explosive RDX, with no published science to back up his claim. The 911 truth movement has never recovered from this error, for to this day nearly everyone in the movement refers to "explosive nanothermite," as even this clever cover for a fictitious "For Dummies" book illustrates. (1)

Examples of Jones confusing these issues are cited and commented upon. Two technical papers on nanothermite are cited to support my contention that nanothermite is not anywhere near being an explosive in the sense of a high explosive like RDX. These two papers are also cited on the issue of adding organics to nanothermites to produce gas generating nano-thermites (GGNT) and I maintain that these papers suggest that the only way to make a nanothermite truly explosive is to combine it with an explosive or other

high-explosive mechanism. “It's not the “nano” that makes it explosive. It's the explosive that makes it explosive.”

Finally, I make recommendations of what those who advocate the nanothermite theory for WTC destruction can do to clarify their position, and I announce The Nanothermite Challenge.

EXAMPLES OF JONES CONFUSING THERMITE AND NANO-THERMITE WITH EXPLOSIVES

Here is a two-paragraph quote from Steven Jones' first paper. (2)

“Thus, molten metal was repeatedly observed and formally reported in the rubble piles of the WTC Towers and WTC 7, metal that looked like molten steel or perhaps iron. Scientific analysis would be needed to conclusively ascertain the composition of the molten metal in detail.”

“I maintain that these observations are consistent with the use of high-temperature cutter-charges such as thermite, HMX or RDX or some combination thereof, routinely used to melt/cut/demolish steel.” (2)

Here Jones puts thermite, HMX, and RDX in the same category. But thermite is totally different than HMX and RDX. Thermite is an incendiary. It gets very hot, it produces molten iron, it can melt steel, and it can catch things on fire, but it is absolutely not an explosive. It is not even a low explosive. On the other hand, HMX and RDX are high explosives. HMX detonates at 9,100 m/s (meters per second) and RDX detonates at 8,750 m/s. He also lumps all three under the category of cutter-charges, but a cutter-charge with thermite would be totally different than a cutter-charge with a high explosive. A thermite cutter-charge would cut by melting the steel with the high-temperature molten iron it produces (an extremely low velocity and slow process compared to high explosives), whereas an RDX cutter-charge would cut by the supersonic detonation of high explosives in what is known as a shaped charge, which essentially produces a supersonic projectile of molten metal (copper is often used in shaped charges) that instantly penetrates and severs the member.

Later in the paper Jones says

“"Superthermites" use tiny particles of aluminum known as "nanoaluminum" (<120 nanometers) in order to increase their reactivity. Explosive superthermites are formed by mixing nanoaluminum powder with fine metal oxide particles such as micron-scale iron oxide dust.” (2)

And further down he says

“Highly exothermic reactions other than jet-fuel or office-material fires, such as thermite reactions which produce white-hot molten metal as an end product, are clearly implied by the data. In addition, the use of explosives such as HMX or RDX should be considered. "Superthermites" are also explosive as must be remembered in any in-depth investigation which considers hypotheses suggested by the available data.” (2)

From page 85 of a presentation that Jones gave early in his work (3), he says

“Gel explosives: Tiny aluminum particles in iron oxide, in a sol-gel: “High energy density and extremely powerful” and “can be cast to shape”
http://www.llnl.gov/str/RSimpson.html (Livermore Nat’l Lab, 2000)”

I have read the LLNL web page that Jones cites above (4) very carefully and I cannot find anything in it that implies that the “thermitic nanocomposite energetic material” referred to is an explosive. It refers to the result as a thermite pyrotechnic, releasing an enormous amount of heat, but it does not say that it is an explosive.

In the web page another class is explained briefly, energetic nanocrystalline composites. "The Livermore

team synthesized nanocrystalline composites in a silica matrix with pores containing the high explosive RDX or PETN." No mention is made here of thermite, so this wouldn't apply to Jones claiming that nanothermite is an explosive.

COMPARING NANOTHERMITE REACTION VELOCITIES TO EXPLOSIVE VELOCITIES

The explanation given for claiming that nanothermite is an explosive goes something like this. The thermite reaction is

$Fe_2O_3 + 2\ Al \ ---> \ 2\ Fe + Al_2O_3$

By making the particle sizes of the reactants smaller, down to the nanosize (approximately 30 nm to 60 nm) and mixing them well, the reaction takes place so fast that it becomes explosive. Let's look at some data from technical papers where the reaction velocity of nanothermites were measured and compare these values with the reaction velocities of explosives to see if it seems reasonable to call nanothermite an explosive.

A paper by Spitzer et al. published in the Journal of Physics and Chemistry of Solids in 2010 presents a variety of research on energetic nano-materials. (5) In one section they deal with nano-thermites made with tungsten trioxide (WO_3) and aluminum nano-particles. They experimented with different particle sizes, but they highlight the mixture made with the smallest nano-particles of both WO_3 and Al for its impressive performance.

"WO_3/Al nano-thermites, which contain only nano-particles have an impressive reactivity. The fireball generated by the deflagration is so hot that a slamming due to overpressure is heard. The combustion rate can reach 7.3 m/s. This value is extremely high compared to classical energetic materials." (5)

A paper by Clapsaddle et al. published by Lawrence Livermore National Laboratory in 2005 also contains some reaction rate data for nanothermite composed of nano-particles of Fe_2O_3 and aluminum. (6) In Figure 2. in the paper the combustion velocity is plotted versus percent SiO_2 content. The highest values were obtained at zero percent SiO_2, so those are the only values I am going to cite. The nanothermite produced by a sol gel process had the highest velocity of 40.5 m/s, compared to the one produced by a simple mixing of the nano-particles with a combustion velocity of 8.8 m/s. (6)

Compare the above combustion velocities of nanothermite with the detonation velocities of high explosives HMX and RDX of 9,100 m/s and 8,750 m/s, respectively, and they are dwarfed by the velocities of the conventional high explosives. Steven Jones appears to be calling the nanothermite reaction explosive only in the sense that it is reacting much faster than regular thermite, but not in the sense that it is anywhere near as explosive as a conventional high explosive. By failing to make this distinction Jones has misled nearly the entire 911 truth movement into believing that nanothermite is a super explosive, possibly even more powerful than conventional high explosives.

From the above, it is quite clear that the "nano" in nanothermite does not make the thermite explosive anywhere near the degree of a high explosive like RDX.

In addition to saying that nano-izing thermite makes it explosive, I have heard Jones say that adding organics to nanothermite also makes it explosive. This issue is explored in the next section.

CAN ANYTHING BE DONE TO MAKE A NANOTHERMITE EXPLOSIVE?

First I would like to quote an entire two paragraph section, with its title, from the LLNL paper. (6)

"Gas generating Al-Fe_2O_3-$SiO_{3/2}$-R (R = $–(CH_2)_2(CF_2)_7CF_3$) nanocomposites. "

"One limitation inherent in any thermite energetic material is the inability of the energetic material to do pressure/volume-work on an object. Thermites release energy in the form of heat and light, but are unable

to move objects. Typically, work can be done by a rapidly produced gas that is released during the energetic reaction. Towards this end, the silica phase of sol-gel prepared oxidizers, in addition to modifying the burning velocities, has also been used to incorporate organic functionality that will decompose and generate gas upon ignition of the energetic composite [3-4,7]. Phenomenological burn observations of these materials indicate that the Al-Fe_2O_3-$SiO_{3/2}$-R nanocomposites burn very rapidly and violently, essentially to completion, with the generation of significant amounts of gas. Figure 5 shows a comparison of the ignition of an energetic nanocomposite oxidizer mixed with 2 μm aluminum metal without (left) and with (middle) organic functionalization. The still image of the energetic nanocomposite without organic functionalization exhibits rapid ignition and emission of light and heat. The still image of the energetic nanocomposite with organic functionalization also exhibits these characteristics, but it also exhibits hot particle ejection due to the production of gas upon ignition. This reaction is very exothermic and results in the production of very high temperatures, intense light, and pressure from the generation of the gaseous byproducts resulting from the decomposition of the organic moieties."

"These materials were also mixed with nanometer aluminum. Figure 5 (right) shows a still image of the ignition of the Al-Fe_2O_3-$SiO_{3/2}$-R nanocomposite mixed with 40 nm aluminum. This composite is much more reactive than the same oxidizing phase mixed with 2 μm aluminum metal; the burning of the composite with 40 nm aluminum occurs much too quickly to be able to observe the hot particle ejection. This observation is a good example of the importance mixing and the size scale of the reactants can have on the physical properties of the final energetic composite material. When the degree of mixing is on the nanoscale, the material is observed to react much more quickly, presumably due to the increase in mass transport rates of the reactants, as discussed above." (6)

Note that in the title of the section quoted above, the symbol R is used to represent the organic functionality added to the nanothermite. In this case it is a 10 carbon atom straight chain functional group fully saturated, with hydrogen atoms on the first two carbon atoms of the chain and fluorine atoms on all the rest. I have not explored the precise energy level of this functional group, but I can tell by just looking at it that it will consume energy (from the thermite reaction) in order to break it down into multiple smaller molecules in order to get the expanding gases necessary to make it behave as explained. This is not an efficient way to make an explosive. I wouldn't expect the explosiveness to be anywhere near that of a conventional high explosive, and the qualitative description given in the paper certainly does not seem to support it being a true explosive, but unfortunately the paper does not give data on what its reaction rate would be. Wouldn't it be better if the organic added to the nanothermite was a molecule that, instead of consuming energy to drive its decomposition, actually produces energy as it decomposes? Such a molecule could be the RDX molecule. This leads to the quoted two-paragraph section below from the Spitzer et al. paper. (5)

"3. Gas generating nano-thermites "

"Thermites are energetic materials, which do not release gaseous species when they decompose. However, explosives can be blended in thermites to give them blasting properties. The idea developed at ISL is to solidify explosives in porous inorganic matrixes described previously. Gas generating nano-thermites (GGNT) are prepared by mixing Cr_2O_3/RDX and MnO_2/RDX materials with aluminium nano-particles. The combustion mechanisms of these nano-thermites were investigated by DSC and high-speed video. In the case of Cr_2O_3-based GGNT, the decomposition of RDX induces the expansion and the fragmentation of the oxide matrix. The resulting Cr_2O_3 nano-particles, which are preheated by the combustion of the explosive, react violently with aluminium nano-particles. In the case of MnO_2-based GGNT, the mechanism of combustion is somewhat different because the decomposition of RDX induces the melting of oxide particles. The droplets of molten MnO_2 react with aluminium nano-particles."

"The non-confined combustion of GGNT is rather slow (1-11 cm/s) in comparison with other nano-thermites presented here. However, in a confined environment their combustion rate is expected to be significantly higher. Indeed, the thermal decomposition of GGNT produces gaseous species, which contribute to increase the pressure and the combustion rate in accordance with the Vieille's law. The thermal decomposition of miscellaneous GGNT compositions was studied in a closed vessel equipped with a pressure gauge. The GGNT were fired with a laser beam through a quartz window. The pressure signal

was recorded along time for each material (Fig. 7). The pressure released by the combustion of a GGNT is directly linked to the RDX content of the nano-composite used to elaborate it. Depending on its formulation, a GGNT can provide a pressure ranging from a few bars to nearly three thousand bars." (5)

I am surprised by the low number given for the reaction velocity, only 1-11 cm/s. Also, it does not say what percent RDX resulted in this low velocity. Maybe it was a very low content of RDX. But the main point I want to make about the above quoted section does not depend on this velocity anyway. The key point is that you have to blend explosives (like RDX) into nanothermite to make it an explosive ("give them blasting properties").

WHAT NANOTHERMITE ADVOCATES NEED TO DO TO CLARIFY THEIR THEORY

Steven E. Jones and other nanothermite theory advocates should be upfront and truthful about these issues, and clearly elaborate upon the factors missing from their theory that need further fleshing out. It is not good enough to just say "explosive nanothermite" over and over again without explaining exactly what is meant by the term. If they think that incendiary thermite or incendiary nanothermite or low explosive nanothermite or high explosive nanothermite were used in cutter-charges, or some combination, then they should say so. The lack of or degree of explosiveness claimed, whether incendiary, low explosive, or high explosive, is key, because the type of cutter-charge used would depend on this. Once they clarify what they mean by their use of the term "nanothermite", then they should start describing the quantities of thermite that would have been necessary for the destruction. Only by adding these details to their theory can it be fairly evaluated against alternative theories of the destruction of the buildings of the World Trade Center for the benefit of the wider 9/11 truth community.

THE NANOTHERMITE CHALLENGE

Find and document peer reviewed scientific research that demonstrates that a gas generating nanothermite (GGNT) based upon iron (III) oxide (Fe_2O_3) and aluminum (Al), where the gas generating chemical added to the nanothermite is not itself a high explosive, can be made to be a high explosive with at least a detonation velocity of 2000 m/s. The author of this paper will donate $100 for every 1000 m/s of detonation velocity that can be documented, the donation not to exceed $1,000. For example, if a detonation velocity of 5500 m/s can be documented, then the donation amount will be $550. Only one prize will be awarded in the form of a donation to AE911Truth, and it will be awarded based upon the highest detonation velocity that can be documented. Those submitting entries grant the author the right to publish their entries. Entries must be in the form of a brief (no longer than one page) write-up, with the peer reviewed research cited, and at least scanned copies (electronic pdf files) of the cover page(s) and pages relied upon of the technical papers, if not a submittal of the entire paper(s). Entries should be sent by email to DetonationVelocity@att.net by June 20, 2011. The award will be announced and paid by July 20, 2011.

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ABOUT THE AUTHOR: T. Mark Hightower began his awakening in January 2004 after having stumbled upon the Serendipity web site and learning that the explosive demolition theory for WTC destruction was a more probable explanation than was the official story.

http://www.serendipity.li/

He has worked as an engineer for nearly 30 years, initially in the chemical industry, then in the space program, and currently in the environmental field. He is a member of the American Institute of Chemical Engineers (AIChE) and the American Institute of Aeronautics and Astronautics (AIAA).
His research on 9/11 is an exercise of his Constitutional rights as a private citizen and in no way represents his employer or the professional societies of which he is a member.

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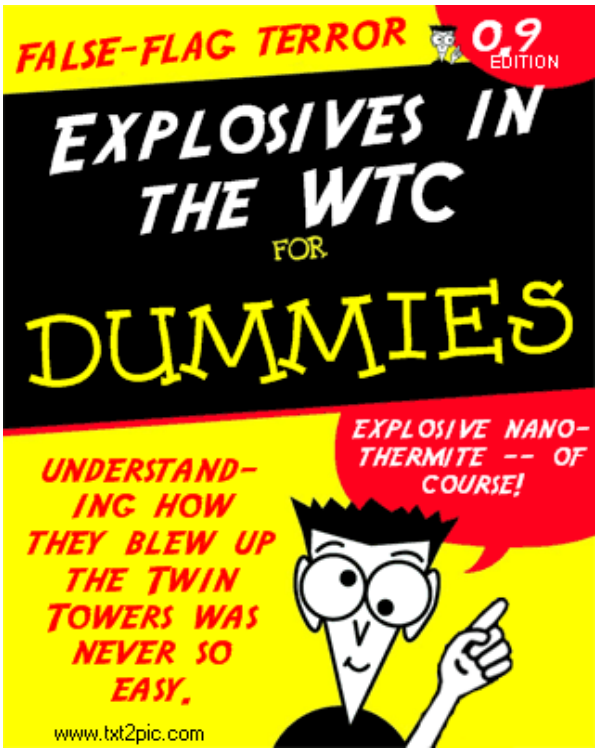

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