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Nowadays, the fictional world of Wakanda may seem like a fantasy, especially all of the “vibranium” materials that makeup Black Panther’s suit and Captain America’s shield. Yet, on a technological scale, the insight of coding and cybersecurity has layers upon layers that prevent viruses from attacking the power source, and these networks reform themselves again and again reducing the amount of invading viruses. In correlation, atomic particles have cohesive energy, which binds the atoms together in accordance with their appropriate covalent bonds. These two combined introduces the foundation of nano-materials, enhancing and fortifying the performance, sustainability, and design of equipment, infrastructures, and other materials. We are on the brink of “Wakanda” innovations; regenerative properties for nano-equipment will soon advance and contribute to the United States’ modern warfare. Research and technology will inevitably change what we have today and what we will have, for the greater good.

Navy SEALs’ operate most of their critical missions in the ocean, yet their level of experience outweighs the state of their equipment. Some may swim at a certain depth without being caught by tracking systems and being fired at in foreign and domestic countries, whilst others take the risky approach of encountering hostiles by boat. The lives of our United States Special Operations Forces are at-stake, and the depreciation of personnel will weaken the defense of the nation, making us an open target. Given the laws of physics, bulletproof vests increase the weight factor of swimming beneath the ocean, protecting the well-being of the SOF personnel, yet delaying the completion of underwater missions. Consequently, there has to be another way to enhance the performance of the Navy SEALs’ personnel; which, in this case, regenerative nano-scuba diving wet suits, formed by nano-materials that withstand wear, tear, and pressure, may solve this problem. Whenever an object impacts the bullet vest, there is only a mark of the object on the vest- not including regenerative properties; whereas the regenerative nano-scuba diving wet suits are able to sustain long periods of damage and penetration, as well as regenerate the nano-materials that were deteriorated. This is most likely due to atoms being highly connected to other atoms, creating an armor made of steel; in other words, the cohesive energy between atoms is highly concentrated, reducing the separation of bonds exponentially. This is only a glimpse of what the future may hold for such innovations, yet research and technology in nano-technology has barely been smudged. Why did Albert Einstein, Marie Curie, and other great pioneers want to change the world? To make tomorrow the successful proficiency of constant innovation; to find solutions for the greater good of humanity. How will our future be driven? By wholehearted purpose, determination, and ambition. As Friedrich Nietzsche said, “He who has a why to live for can bear almost any how.”

Being able to think beyond what can be done is an inspiration to my curiosity and creativity, but to bring these ideas to fruition in the Navy and Marine Corps is a dream come true. An arsenal that is combat-ready even in the highest magnification will turn the tides of modern warfare. Nano-materials offer a perspective into the functions and composition of atomic particles: extreme reactions, various movements, and theoretical structures. The extreme reactions are like C4 explosions and poisonous gas production; the various movements are the separations and bindings; and the theoretical structures are the compositions of isotopes, ions, and antimatter. According to Dr. Richard Ordonez, graphenes and quantum dots- nano-particles- are used in sensors that capture data, aiding in visual analysis with varying degrees: visibility, infrared, etc.; as well as in naval communication devices over long distances; and in multi-spectral image cameras which determine the quality of the food- whether or not a particular food is spoiled or not. These nano-materials can also be applied to the field of fluid

mechanics, optimizing cleaner fueling systems by reducing the amount of bio-fuel growth in fluid channels and fluid tunnels. Because of scientists like Dr. Richard Ordonez, a nano-materials researcher, and Dr. Karen Flack, a fluid mechanics professor at the Naval Academy, who both exceeds the standards of current research developments, students and researchers around the world can gain knowledge and experience for the betterment of their home, their nation, and their community.

For my career goals, I would like to become a mechanical engineer for high-tech companies like the Boeing Company, Microsoft, or even NASA, which supports the U.S. Space Force in accomplishing their space endeavors; thus, the work of Dr. Flack is important to the pursuit of my ambitions. By connecting Dr. Ordonez's nano-material studies to Dr. Flack's fluid mechanics research, there will be a composite of integrated nano-materials, efficient equipment, and less consequential effects such as drags- a fluid's friction against surfaces that have paint, bio-fouling substances- slimes and grasses- and hard foulings- barnacles. To find a way to increase the fluid movement speed is to allocate stronger nano-materials for the manufacturing of fluid tunnels, channels, and pipes. These new and improved fluid tunnels, channels, and pipes will then reduce drag-producing substances, leading to more powerful and sustainable performances in vehicles. Dr. Flack, who values the input of midshipmen, colleagues, and family, inspires me to innovate and contribute to the field of mechanical engineering with my curiosity which brings about safe and efficient electric airplanes, glasses circuited to virtual interactions- pressing a virtual button through realistic perceptions- and countless more innovations undiscovered. Science has rebirthed and revitalized possibility with impossibility: When flash drives by IBM were sold in 2000; when Apple had their first iPhone in 2007; when Curiosity, the First Mars Rover landed in 2012, as well as the Perseverance Rover in 2020; and other historic breakthroughs in science and technology, have hinted to what 15-20 years from now will hold. There's an infinite amount of outcomes; it's a matter of what we will do to get to a certain outcome.

Without the researchers who are constantly finding ways to overcome potential barriers, we wouldn't have what we see today. There would be no long-distance communication platforms and devices, no reliable automobiles to travel from state to state, and none of the things that are powered by research and technology. The present circumstances also reveal a glimpse of what the future will hold- there will be regenerative materials that will replace standard manufacturing materials in all field and laboratory equipment and infrastructures, and a scanning machine that quantifies and predicts the drag of full-scale surface textures in which computationalists can analyze and improve the auto-configurations of their systems. Though these are the goals in a span of 20 years from now, imagine the long-term developments after 40 years, 60 years, and beyond. It's only a matter of time until Artificial Intelligence robots have the ability to innovate and create extraordinary works; yet, these AI's have a weak point that humans have as a strength: wholehearted purpose, passion, and love; these are the feelings that drive innovation. The future of the Department of Defense, the United States, and the world, will depend on how curiosity is utilized, and why it is used.