

**2015 SIEMENS COMPETITION IN MATH, SCIENCE & TECHNOLOGY**  
**National Finalists – Team Winners**

**DANIEL CHAE**, Thomas Jefferson High School for Science and Technology, Alexandria, Va.

**ALAN TAN**, Irvington High School, Fremont, Calif.

**SIDHARTH “SID” BOMMAKANTI**, Amador Valley High School, Pleasanton, Calif.

**PROJECT:** A Novel Study on the Effect of Surface Topography of 3-D Printed PLA Scaffolds on Dental Pulp Stem Cell Proliferation and Differentiation in vitro.

**FIELD:** Materials Science

**MENTOR:** Dr. Adriana Pinkas-Sarafova, Adjunct Assistant Professor, Stony Brook University

*“With [our] project, the world can have more cost-effective and improved bone implants.”*

Daniel Chae, Alan Tan and Sidarth Bommakanti’s research project, assesses 3-D printed structures as an alternative to plating dental pulp stem cells (DPSCs) for use as implants. The team found that DPSCs are able to differentiate substantially more on 3-D prints than on currently used structures, suggesting that 3-D printed structures could be a cheaper and better alternative for bone or dental implants. The team was able to convert the challenge of having two different kinds of 3-D printers in the lab into an opportunity by comparing the structures from the two printers, which helped draw conclusions about the reproducibility of 3-D printers.

A common interest in the rapid rise of 3-D printing applications and the potential for stem cells to dramatically evolve the medical field inspired the team to pursue this research.



**DANIEL CHAE**

**YEAR:** Senior

**HOMETOWN:** Oakton, Va.

Daniel’s favorite subject in school is math because of its variety and depth. He first got excited about mathematics in 6th grade, when he began to get involved in his school’s MathCounts team. In college, he anticipates to channel this passion as a biology or chemical engineering major. He ultimately aspires to be a physician.

Daniel’s interdisciplinary mind has led him to pursue a wide range of interests, as he currently serves as the co-president of his school’s Latin Honor Society, is proficient in Korean and also enjoys archery. After school, Daniel serves as the chemistry and biology tutor for students. He believes that if there were to

be a dramatic advancement of society using discoveries in science, then more people would become engaged in science and math.

Daniel's role model is American scientist Linus Pauling, and if he could speak with any person in history, it would be Roman poet Vergil.



**SIDHARTH "SID" BOMMAKANTI**

**YEAR:** Senior

**HOMETOWN:** Pleasanton, Calif.

Sidharth Bommakanti wants to pursue a career in medicine. His interest in the field has been fueled by his passion for biology, and the potential for biological science to impact lives. Similarly, Sidharth also tutors underclassmen in chemistry and biology. He anticipates majoring in molecular and cellular biology.

Sidharth's inspiration comes from a number of sources – his sister's success in a local science fair in middle school originally motivated him to pursue STEM subjects. Her later pursuits in medicine also inspired Sidharth to take an interest in pursuing a future in medicine. One of his earliest STEM memories was when he won first place in Science Olympiad as a 6th grader. His proudest accomplishments to date are a 4th place finish at the California State Science Fair and a 3rd place finish at the International Career Development Conference.

Outside of school, Sidharth participates in Project Wellness Water, a dual filtration system that purifies contaminated water in rural communities. He also serves as Vice President of his school's Environmental Club, and volunteers at Valley Care Hospital.

In his free time Sidharth enjoys tennis and basketball. And though he is a Californian, his favorite player is Dallas Maverick's all-timer Dirk Nowitzki, known for his cool on the court and smooth shot.



**ALAN TAN**

**YEAR:** Senior

**HOMETOWN:** Fremont, Calif.

Alan Tan aspires to be a medical researcher. More specifically, what interested him in his current area of research is the potential for dental pulp stem cells (DSPCs) to circumvent ethical concerns about using stem cells for research. He soon found himself engrossed in the subject, learning that DSPCs are a source of stem cells that could be very useful in the regeneration of various body parts, including bones.

Outside of the classroom, Alan has been recognized for his volunteer service – earning a Presidential Service Award. He is also a mentor in STEM subjects at school, serves as Vice President of his school’s science club, plays the piano, and likes to shoot hoops

Alan anticipates majoring in either chemistry or biochemistry in college. If he could talk to any figure in history, Alan would love to speak with Isaac Newton, the father of early physics and calculus.