

# Hyeeyeon Choi

AGE: 18  
HOME: DIX HILLS, NY  
INVENTION: THE EFFECT OF SUPERCRITICAL FLUIDS ON POLYMER THIN FILMS



HYEYEON CHOI SPENT HER EARLY CHILDHOOD IN KOREA. SHE REMEMBERS GETTING INTO A SPOT OF HOT WATER IN SCIENCE CLASS WHEN SHE EXPERIMENTED WITH HER SCHOOL SUPPLIES BY BOILING THEM.



AT AGE TWELVE, HYEYEON'S FAMILY MOVED TO THE UNITED STATES WHERE SHE EXCELS IN SCHOOL AND SERVES AS THE PRESIDENT OF SEVERAL SCHOOL CLUBS. OH, AND DID I MENTION THAT SHE IS ALSO AN ACCOMPLISHED VIOLINIST, PIANIST, AND DRUMMER?



BEFORE HER SENIOR YEAR, SHE ATTENDED THE GAROJA SUMMER RESIDENT PROGRAM FOR HIGH SCHOOL SCHOLARS AT STONYBROOK STATE UNIVERSITY WHERE SHE BEGAN TO INVESTIGATE THE PROPERTIES OF SUPERCRITICAL FLUIDS.



SUPERCRITICAL FLUIDS HAVE PROPERTIES OF BOTH LIQUID AND GAS, AND, AS HYEYEON DISCOVERED, CAN BE USED AS UNIVERSAL SOLVENTS FOR POLYMERS. THE RESULT OF THIS RESEARCH LED TO THE DEVELOPMENT OF...



THE EFFECT OF SUPERCRITICAL FLUIDS ON POLYMER THIN FILMS, WHICH ALLOWS DISSIMILAR POLYMERS TO BE BLENDED EFFECTIVELY AND CHEAPLY. THIS INNOVATIVE PROCESS WON THE 2003 INTEL SCIENCE TALENT SEARCH, THE SIEMENS WESTINGHOUSE LONG ISLAND SCIENCE AND ENGINEERING FAIR, AND THE INTEL INTERNATIONAL SCIENCE AND ENGINEERING FAIR.

AFTER GRADUATION, HYEYEON PLANS TO STUDY CHEMICAL ENGINEERING IN COLLEGE AND BECOME A RESEARCHER.





# Joline Fan

AGE: 17  
HOME: COLUMBUS, OH  
INVENTION: MICROBUBBLE DRAG  
REDUCTION AND ACOUSTIC HEAT  
TRANSFER ENHANCEMENTS OF  
DRAG REDUCING SURFACTANTS

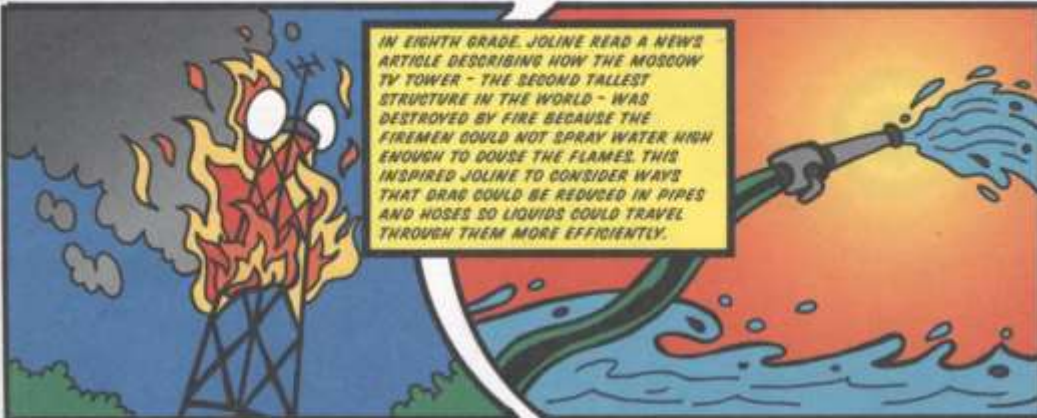
JOLINE FAN IS A BUSY GIRL. IN ADDITION TO BEING AN ACCOMPLISHED VIOLINIST, SHE COMPETES BOTH ON THE VARSITY TRACK TEAM AND SPEECH AND DEBATE TEAM. REPRESENTS HER SCHOOL IN THE CHEMISTRY OLYMPIAD, RANKS FIFTH IN THE STATE IN FENCING, AND, IN HER SPARE TIME, VOLUNTEERS AT BOTH A LOCAL HOSPITAL AND SCIENCE MUSEUM.



THE STUDY OF SCIENCE PLAYS A BIG PART IN JOLINE'S FAMILY. HER MOTHER IS A CHEMIST, AND HER FATHER TEACHES CHEMICAL ENGINEERING AT OHIO STATE UNIVERSITY. IN FACT, JOLINE MARIE IS NAMED AFTER MARIE CURIE, AND HER BROTHER, JONATHAN ALBERT, IS NAMED AFTER - YOU GUESSED IT - ALBERT EINSTEIN.



IN EIGHTH GRADE, JOLINE READ A NEWS ARTICLE DESCRIBING HOW THE MOSCOW TV TOWER - THE SECOND TALLEST STRUCTURE IN THE WORLD - WAS DESTROYED BY FIRE BECAUSE THE FIREMEN COULD NOT SPRAY WATER HIGH ENOUGH TO DOUSE THE FLAMES. THIS INSPIRED JOLINE TO CONSIDER WAYS THAT DRAG COULD BE REDUCED IN PIPES AND HOSES SO LIQUIDS COULD TRAVEL THROUGH THEM MORE EFFICIENTLY.



OVER THE NEXT SEVERAL YEARS, JOLINE'S RESEARCH LED TO A NUMBER OF COMPLEX INNOVATIONS INVOLVING SURFACTANTS, HEAT TRANSFER TECHNOLOGY, ULTRASONIC ENERGY, AND GAS INJECTORS IN THE IMPROVEMENT OF FLUID SYSTEMS, CULMINATING IN...



...ENHANCEMENTS IN HEAT TRANSFER OF SURFACTANTS AND DRAG REDUCTION USING MICROBUBBLES IN PIPE FLOWS. THESE ACCOMPLISHMENTS EARNED JOLINE NUMEROUS AWARDS, INCLUDING THE 2002 FINALIST-INTEL INTERNATIONAL SCIENCE AND ENGINEERING FAIR, UNITED TECHNOLOGIES 1ST PLACE AWARD, US PATENT OFFICE HONORABLE MENTION, 2003 INTEL 1ST PLACE GRAND AWARD IN ENGINEERING, 2003 INTEL ACHIEVEMENT AWARD, AND THE SCHLUNBERGER EXCELLENCE IN EDUCATIONAL DEVELOPMENT AWARD, JUST TO NAME A FEW.

AFTER GRADUATION, JOLINE PLANS TO MAJOR IN CHEMISTRY IN ORDER TO BECOME A MEDICAL RESEARCHER, A SURGEON, OR AN ENGINEER.



# Elena Glassman

AGE: 17  
 HOME: PIPERSVILLE, PA  
 INVENTION: BRAIN-COMPUTER  
 INTERFACE FOR THE  
 MUSCULARLY DISABLED



WHEN SHE WAS 18 MONTHS OLD, ELENA LEAH GLASSMAN SURPRISED HER PARENTS WHEN THEY FOUND HER USING THE FAMILY COMPUTER WITHOUT ANYONE'S HELP. THIS MADE HER FATHER, AN ELECTRICAL ENGINEER, AS PROUD AS PUNCH!



BUT ASIDE FROM BEING A COMPUTER WHIZ, ELENA ALSO COMPETES IN SOCCER, PLAYS TRUMPET IN THE SCHOOL BAND, RUNS THE HIGH SCHOOL FRISBEE CLUB, AND VOLUNTEERS AT HABITAT FOR HUMANITY.



IN HER SOPHOMORE YEAR, ELENA ATTENDED A BIOENGINEERING CONFERENCE AT DREXEL UNIVERSITY WHERE SHE WITNESSED A PARALYZED MAN USE HIS HANDS TO MOVE OBJECTS ON A TABLE.



THIS WAS ACCOMPLISHED BY MEANS OF A BRAIN-COMPUTER INTERFACE (OR BCI) THAT STIMULATES THE USER'S ARM AND HAND MUSCLES IN ACCORDANCE WITH HIS BRAINWAVES.



THIS INSPIRED ELENA TO RESEARCH AND DEVELOP A COMPUTER PROGRAM THAT MORE ACCURATELY RECOGNIZES HUMAN BRAINWAVE PATTERNS FOR BCI APPLICATIONS. ELENA'S PROGRAM THE BRAIN-COMPUTER INTERFACE PROGRAM FOR THE MUSCULARLY DISABLED HAS RECEIVED NEARLY A DOZEN AWARDS, INCLUDING THE 2003 INTEL FOUNDATION YOUNG SCIENTIST AWARD, THE 2003 CALTECH/JET PROPULSION LAB SPECIAL ACHIEVEMENT AWARD, THE 2003 UNITED TECHNOLOGIES CORPORATION FOR EXCELLENCE IN SCIENCE AND ENGINEERING AWARD, AND A 2ND PLACE AWARD FROM THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS.

ELENA PLANS TO ATTEND COLLEGE AND GRADUATE SCHOOL IN ORDER TO BECOME A PROFESSOR OF ELECTRICAL ENGINEERING.



# Vaishali Grover

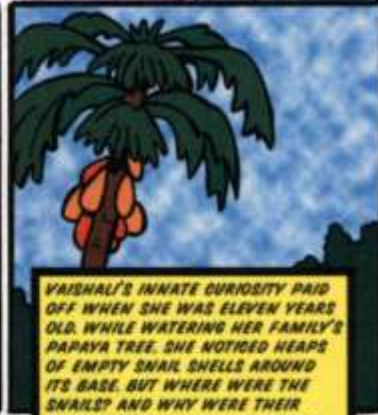
AGE: 15  
HOME: MIAMI, FL  
INVENTION: SHIP SHAPE  
ENZYMIC-BASED ANTI-FOULING PAINT



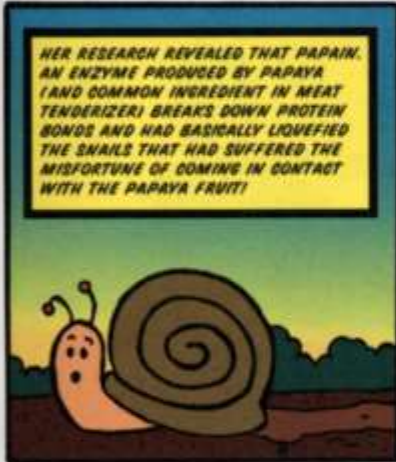
VAISHALI GROVER DESCRIBES HERSELF AS AN "ECLECTIC LEARNER". HER NUMBER ONE PASSION IS FILM, BUT SHE ALSO ENJOYS INDIAN CLASSICAL DANCE, ROWING, AND YOGA. (OH, AND SHE PLANS TO ADD FENCING TO THE LIST SOON.)



THE THIRST FOR LEARNING MIGHT BE EXPECTED FROM ONE WHOSE FIRST SPOKEN WORD WAS "MOON", AND WHO LEARNED TO READ AT THE AGE OF TWO.



VAISHALI'S INNATE CURIOSITY PAID OFF WHEN SHE WAS ELEVEN YEARS OLD. WHILE WATERING HER FAMILY'S PAPAYA TREE, SHE NOTICED HEAPS OF EMPTY SNAIL SHELLS AROUND ITS BASE. BUT WHERE WERE THE SNAILS? AND WHY WERE THEIR SHELLS FOUND ONLY AROUND THE PAPAYA TREE?



HER RESEARCH REVEALED THAT PAPAIN, AN ENZYME PRODUCED BY PAPAYA (AND COMMON INGREDIENT IN MEAT TENDERIZER) BREAKS DOWN PROTEIN BONDS AND HAD BASICALLY LIQUEFIED THE SNAILS THAT HAD SUFFERED THE MISFORTUNE OF COMING IN CONTACT WITH THE PAPAYA FRUIT!



VAISHALI THEN SURMISED THAT THESE NATURAL ENZYMES COULD BE INCORPORATED INTO MARINE PAINT TO PREVENT BARNACLES AND MOLLUSKS FROM BUILDING UP ON SHIPS' HULLS. THIS WAS CREATED.



SHIP SHAPE ENZYME-BASED ANTI-FOULING PAINT, WHICH HAS WON NUMEROUS HONORS, INCLUDING THE 2003 INTEL FOUNDATION ACHIEVEMENT AWARD, AS WELL AS AWARDS FROM THE ENVIRONMENTAL PROTECTION AGENCY, UNITED TECHNOLOGIES CORPORATION, THE U.S. NAVY & MARINE CORP. AND THE U.S. COASTGUARD. SHIP SHAPE ALSO HAS A PATENT PENDING.



NO ONE KNOWS WHAT THE FUTURE HOLDS FOR VAISHALI, BUT AT PRESENT SHE HOPES TO PURSUE A CAREER IN DOCUMENTARY FILMMAKING.

# Chandler Macocha

AGE: 13  
HOME: OXFORD, MI  
INVENTION: THE WHEELCHAIR  
BACKPACK HELPER

FROM CHILDHOOD, CHANDLER MACOCHA HAS ENJOYED CREATING THINGS OUT OF ANY MATERIALS HE COULD GET HIS HANDS ON. HIS GRANDMOTHER STILL TREASURES A PAPER MODEL HE MADE OF THE TITANIC.

ASIDE FROM SNOW SKIING AND PLAYING THE TRUMPET, MOST OF CHANDLER'S INTERESTS CENTER AROUND SCIENCE. HE HAS ATTENDED THE NASA SPACE ACADEMY IN ALABAMA, IS A MEMBER OF HIS SCHOOL SCIENCE CLUB, AND IDOLIZES ALBERT EINSTEIN.



ALWAYS LOOKING FOR A PROBLEM TO SOLVE, CHANDLER ASKED HIS NEIGHBOR, WHO IS A WHEELCHAIR USER, WHAT PARTICULAR DIFFICULTIES SHE EXPERIENCED. SHE EXPLAINED THAT IT WAS NEARLY IMPOSSIBLE TO REACH AROUND TO THE REAR OF THE WHEELCHAIR TO RETRIEVE ITEMS SUCH AS A PURSE OR A BACKPACK.



CHANDLER'S SOLUTION TO THIS PROBLEM WAS THE WHEELCHAIR BACKPACK HELPER, A DEVICE THAT CAN ATTACH TO ANY WHEELCHAIR, AND ALLOWS ITEMS STORED AT THE BACK OF THE CHAIR TO BE SWUNG AROUND TO THE SIDE FOR EASY RETRIEVAL.

THE WHEELCHAIR BACKPACK HELPER WAS A NATIONAL CHAMPION AT THE 2003 SEARS/CRAFTSMAN NETA YOUNG INVENTORS AWARD PROGRAM, AND ALSO HAS A PATENT PENDING.

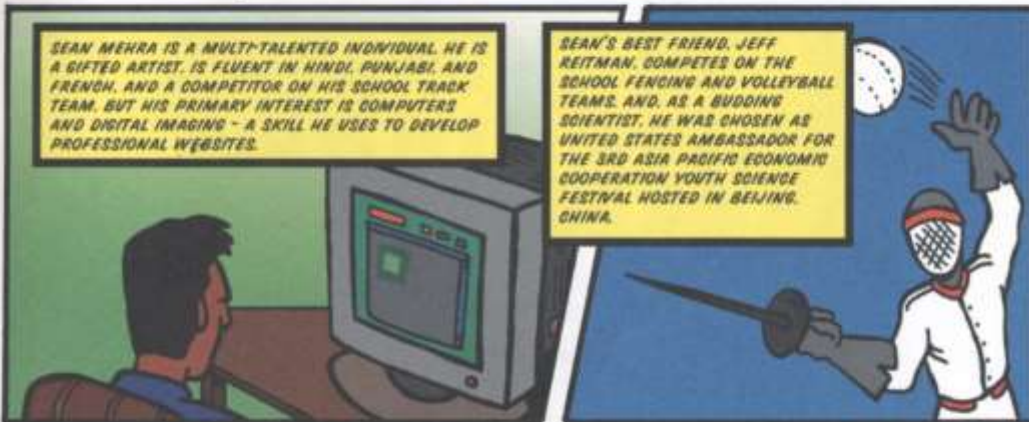
AFTER HIGH SCHOOL AND COLLEGE, CHANDLER'S GOAL IS TO BE A FLIGHT DIRECTOR FOR NASA, OR AN ENGINEER AT DISNEY WORLD.





# Jeffrey Reitman & Sean Mehra

AGE: 17  
 HOME: JERICHO, NY  
 INVENTION: USING NANOPARTICLES TO ENHANCE POLYMER PROPERTIES FOR IMPROVED COMMERCIAL APPLICATION: SPACE LUBRICANTS TO NANOLITHOGRAPHY



SEAN MEHRA IS A MULTI-TALENTED INDIVIDUAL. HE IS A GIFTED ARTIST, IS FLUENT IN HINDI, PUNJABI, AND FRENCH, AND A COMPETITOR ON HIS SCHOOL TRACK TEAM. BUT HIS PRIMARY INTEREST IS COMPUTERS AND DIGITAL IMAGING - A SKILL HE USES TO DEVELOP PROFESSIONAL WEBSITES.

SEAN'S BEST FRIEND, JEFF REITMAN, COMPETES ON THE SCHOOL FENCING AND VOLLEYBALL TEAMS, AND, AS A BUDDING SCIENTIST, HE WAS CHOSEN AS UNITED STATES AMBASSADOR FOR THE 3RD ASIA PACIFIC ECONOMIC COOPERATION YOUTH SCIENCE FESTIVAL HOSTED IN BEIJING, CHINA.



SEAN AND JEFF BECAME CLOSE FRIENDS AT SCHOOL WHERE THEY WORKED ON A NUMBER OF SCIENCE PROJECTS TOGETHER. SEAN WOULD TAKE DETAILED AND ARTISTICALLY ILLUSTRATED NOTES, WHILE JEFF TENDED TO RELY ON HIS MEMORY ALONE.

PRIOR TO THEIR SENIOR YEAR, JEFF AND SEAN ATTENDED A SUMMER RESEARCH FELLOWSHIP HOSTED BY THE STATE UNIVERSITY OF NEW YORK AT STONY BROOK. THERE THEY JOINTLY DEVELOPED TWO IMPORTANT INNOVATIONS USING NANOPARTICLES TO ENHANCE POLYMER PROPERTIES FOR IMPROVED COMMERCIAL APPLICATION: SPACE LUBRICANTS TO NANOLITHOGRAPHY. THESE ADVANCES IN NANOTECHNOLOGY GREATLY IMPROVE THE PERFORMANCE BOTH OF LUBRICANTS IN SPACE APPLICATIONS AND POLYMERS IN MICROCHIP PRODUCTION.



THESE TWO ACHIEVEMENTS WERE AWARDED 1ST PLACE IN THE 2002 TOSHIBA/NSTA EXPLORAVISION COMPETITION, AND 2ND PLACE IN THE 2003 SIEMENS WESTINGHOUSE COMPETITION.

BOTH SEAN AND JEFF HAVE BEEN ACCEPTED TO ATTEND YALE UNIVERSITY. JEFF PLANS TO STUDY PRE-MED, AND SEAN WILL PROBABLY DO THE SAME - WITH AN ADDED DASH OF COMPUTER SCIENCE AND BUSINESS EDUCATION.