Dr. Jason T. Sebastian  
Trustee (2018-2021)

Dr. Jason T. Sebastian  
President  
QuesTek Innovations LLC  
Evanston, IL

Jason T. Sebastian, Ph.D. is the President of QuesTek Innovations LLC. QuesTek Innovations is a small business in Evanston, IL focused on the computational design, development, and insertion of new alloys and materials using Integrated Computational Materials Engineering (ICME) methodologies. Sebastian also serves on the Board of Directors of QuesTek Europe AB (Stockholm, Sweden), a joint venture company formed by QuesTek Innovations LLC and Thermo-Calc Software AB that offers ICME modelling and materials design services to the European market.

Sebastian is a summa cum laude graduate of the University of Illinois at Urbana-Champaign where he earned a B.S. in Ceramic Engineering and a B.A. in Philosophy. After a year of post-graduate study at Cambridge University (Churchill College) with the support of a Winston Churchill Foundation Scholarship, he went on to earn a Ph.D. in Materials Science and Engineering from Northwestern University under the supervision of Prof. David Seidman and with the support of a Department of Defense National Defense Science and Engineering Graduate Fellowship.

At QuesTek, Sebastian is focused on overall company growth and management, and on the entire spectrum of commercial- and government-sponsored alloy modeling, development, and deployment activities. Since joining QuesTek in 2006, his technical activities have focused on: the development of high strength steels for structural and power transmission applications; precipitation-strengthened cobalt-based alloys; alloys for additive manufacturing; non-toxic, high-strength/low-friction copper-based alloys to replace lead-containing bronzes; a low-cost, castable titanium alloy; a highly-processable nickel-based superalloy; advanced soft magnetic alloys; and other computationally-designed alloys.

Sebastian has been the author/co-author on numerous technical papers and publications, and he holds two patents. His ASM International service includes terms as Vice-Chair (2015-2016), Chair (2016-2017), and Membership Chair (2017-2018) of the Chicago Regional Chapter, and a term as the “District 13 Representative” on the Chapter Council (2017-2018).
Abstract – Dr. Jason T. Sebastian
President
QuesTek Innovations LLC
Evanston, IL

“Ferrium M54 – ICME Development from Genome to Flight”

This talk will present a “success story” overview of the development of their new ultra-high strength, high performance structural steel, Ferrium® M54™. The development of this alloy was sponsored under a U.S. Navy-funded Small Business Innovation Research (SBIR) program with the goal of developing a cost competitive, drop-in replacement for AerMet®100 aerospace alloy. A variety of Integrated Computational Materials Engineering (ICME) - and “Accelerated Insertion of Materials (AIM)”-type computational models were employed during the design and development of M54, and highlights will be presented. M54’s overall development progressed from a clean sheet design in 2007 to a precise chemical composition in less than one year, and the first 10-ton VIM/VAR ingot was produced the following year. An Aerospace Material Specification (AMS 6516) was issued two years later, and inclusion in the MMPDS handbook for A- and B- basis design minima was approved in December 2013. QuesTek coordinated the production and qualification of hook shank components made from M54 that were successfully flight tested in December 2014. Highlights will be presented from a recent (August 2016) National Institute of Standards and Technology-funded case study (carried out by Nexight Group and Energetics Incorporated) detailing overall timeline of the successful development of M54 and its application to U.S. Navy hook shanks. Results and data for M54 will be presented from throughout the alloy development process, with a focus on the properties that distinguish it from legacy materials. Highlights of recent M54 application and commercialization activities will also be presented.
Abstract – Dr. Jason T. Sebastian
President
QuesTek Innovations LLC
Evanston, IL

“New High Performance Alloys Designed Specifically for Additive Manufacturing Processes”

Current alloys used in Additive Manufacturing (AM) were originally designed to be processed via traditional metallurgy paths such as forging, and have different microstructures and properties when put through AM processes. Additionally, heat treating AM-built alloys according to standard industry practice causes material performance issues. New material chemistries designed specifically for AM processing and subsequent thermal processing steps tailored for the unique microstructures must be developed to enable AM components to reach enhanced performance. Integrated Computational Materials Engineering (ICME) technologies are effective tools to reconfigure the materials development much more quickly and at less cost than empirical trial and error methods of material development. QuesTek Innovations LLC has successfully used ICME technologies to design novel, improved alloys that are displacing materials that have been used for decades in demanding applications such as Air Force and Navy landing gear, helicopter transmissions and high performance racing. QuesTek has used ICME technologies to optimize legacy alloys and design entirely new alloys tailored specifically for AM, and to optimize post-build heat treatments across a variety of alloy systems including Al, Ti, Ni, Cu, W, Fe and stainless steel. Specific examples will be presented of US Army and US Navy-funded projects for QuesTek demonstrate (i) a Ti new alloy with 20% increase in strength over traditional Ti-6-4 in AM, (ii) a high performance carburizable steel for AM gear applications and (iii) new, printable, high strength aluminum alloys for use at room temperature and temperatures up to 325°C.