CERAMIC TECH CHAT

Episode 67

Title – "Finding community in modern manufacturing: Keith DeCarlo"

INTRO

McDonald: "I'm Lisa McDonald, and this is Ceramic Tech Chat.

> The benefits of belonging to a community, be that social or professional, are well established. However, finding your role within that community is not necessarily an easy or straightforward path. But sometimes it just takes connecting with that one right person who can set you on the path to belonging in the group."

DeCarlo: "I joined ACerS back in 2002, 2003, as a student. You know, when I first came to Alfred [University] with the Materials Advantage. As an undergrad, my interaction with ACerS was unfortunately limited. After school, at that time I started trying to find a spot in ACerS that best fit what I was looking for. And then Dr. Carty called me with the idea to create the Manufacturing Division, and since then, I really found my spot."

McDonald: "That's Keith DeCarlo, president and chief operating officer of Blasch Precision Ceramics. During his years as an ACerS member and rising through the ranks at Blasch, Keith has come to appreciate the importance of collaboration and listening to different perspectives to devise the best solution. He even received an MBA in finance at the State University of New York at Albany to complement his technical knowledge and allow him to serve as a well-rounded leader at Blasch and within ACerS.

> In today's episode, Keith will explain how his educational journey led him to work at Blasch, describe some of the projects he has worked on at Blasch, and share the ways in which he has become actively involved in the Society."

> (music)

SECTION 1

DeCarlo: "It really all started in high school chemistry for me. I had an awesome teacher, Mr. D'Ambrosio, who really got me excited about chemistry and just different interactions of elements and forming molecules. And from there, I really got interested in understanding the chemistry behind things and really found an interest in kind of inorganic type things, like ceramics, for example. So, that's kind of where it started primarily for me.

> From there, I moved to Alfred University. My dad actually suggested that for me because he knew of it when he was looking for schools. He ended up going to St. John's down in

the city, but he was always interested in Alfred and the ceramic program there. So, that was what excited me at first, and then taking visits out there, learning more about it.

And the other thing too was my grandfather was an engineer for Lockheed Martin, and he worked on the space shuttle. So, I had a lot of interest in that because I would get a lot of things from him as a child, you know, models of the space shuttle, models of rockets, blueprints and stuff. So, all that kind of contributed into pushing me towards this line of work and this line of research.

And then from there, in 2002, I started at Alfred University. I did a study abroad actually in 2005 at the University of Sheffield over in the United Kingdom. I definitely needed to be in an English-speaking country. So, that's kind of what pushed me towards that. But that was awesome, living in England for a while, made lifelong friends over there, and learned a lot.

It was interesting. So, Alfred is known for its ceramics and glass sciences. And I am an exception to the rule with glass because all my glass credits I took at Sheffield. I haven't taken a single glass class at Alfred, which is kind of unique. But it was interesting because when I got back and I was talking to glass science majors, I had a really different perspective on it. And it kind of helped to broaden all of our knowledge in glasses at least.

And then coming back and doing my thesis for my bachelor's with Dr. Carty on particle–particle interactions, of course, it's a Dr. Carty project, so there's got to be some rheology in there somewhere. So, that was great. And then, you know, from there, moving on to my master's, that was focused on thermodynamics and understanding interdiffusivity of alumina into silica. So, really using that to model sintering behavior of alumina products and alumina composites. And then moving on with my Ph.D. again at Alfred, all that through Alfred, focused on looking at the DLVO model, which typically is utilized for aqueous suspensions. We applied that to nonaqueous suspensions, which really hadn't been done because of the lack of research with nonaqueous suspension mediums and the parameters needed to apply that. So, a lot of interesting things, theoretical things, and getting down into the lab and getting some actual data and applying it to the model to demonstrate it. So, that was a lot of fun there.

And then from there, I moved on literally right after my graduation, the next day I was at Blasch Precision Ceramics as a research engineer. So, that's kind of my journey to starting with ceramics and gaining an understanding and a want to learn more about them through my dad and my grandfather, and then all the way through school with a couple degrees after that, so."

McDonald: "It was definitely one thing right after the other, just so many opportunities kept rolling back-to-back for you."

DeCarlo: "Oh yes."

McDonald: “So, how is it that you found out about Blasch, that you had that job offer already lined up right after graduation? What was the journey there about learning about this company and then applying and getting accepted?”

DeCarlo: “Yeah. So, at the Alfred career fair, there was a lot of companies there. And, you know, I would go to a couple of them throughout the years, and this was the first year that I saw Blasch Precision Ceramics represented there. So, I stopped by and started talking to the two people in the booth who happened to be Les Lack and Jack Parrish, who were, Les led operations and Jack was leading the company as CEO. And Les was really excited about the products they were making, the prospects they had, and so was Jack, obviously, showing me pictures and just genuine excitement about the company and the products and ceramics in general.

So, meeting with them and then being invited to interview, I met a lot of people there. I really enjoyed the location in Albany, New York, as I grew up in Long Island and then went to school in Alfred. It was a really nice middle ground geographically and socially. You know, you didn’t have to drive 40 minutes to a grocery store like you would in Alfred, but you also didn’t have to drive 40 minutes to a grocery store like you would in Long Island because of traffic.”

McDonald: “Finding that perfect balance.”

DeCarlo: “Yeah, exactly. So, it was a great spot for me. You know, I love to snowboard, I love to do some outdoor activities like hiking and things. So, it was just a great area to be in.

So, went over there, interviewed, and was offered the position of a research engineer. And that’s kind of where I started in their lab, formulating some new products, making new advances on current products to make things more efficient in manufacturing, and working to commercialize these products.”

McDonald: “We can really say that that serendipitous experience of meeting them at the job fair has worked out for you because you have now rose through the ranks to president and chief operating officer as of August 2026, I believe. Is that correct?”

DeCarlo: “That is correct, yes. You know, from research engineer, I was promoted to managing the R&D department at Blasch, and then eventually vice president of technology and then executive vice president of operations. So, it’s really nice being able to grow like that and meet people in the business and meet people externally as well. So, you have a lot of interesting things to work with.”

(music)

SECTION 2

McDonald: “Can you tell our listeners maybe some examples of the products that you’ve worked on, like if there’s broad categories that Blasch focuses on and then any specific products that you’re really proud of that you’ve helped work on over the years?”

DeCarlo: “Sure, yeah. So, Blasch primarily, we work a lot with aerospace companies in the forming of the metal for the airplane engines. Airplane engines are obviously very high temperature, a lot of refractory metals, so they need ceramics to be able to contain those molten metals at very high temps. Typically, you know, sixteen to seventeen to sometimes even eighteen hundred Celsius. So, that’s primarily one of our focuses. And our other focus at Blasch is the energy and chemical side. So, working with petrochemical refinement, environmental products such as flue gas desulfurization nozzles, hydrogen reforming tunnels. So, we do a lot of energy systems at Blasch.

So, with those two markets that we generally focus on, I’ve done a lot of work throughout my years, obviously. But one of the first things I worked on was these silicon nitride nozzles for flue gas desulfurization. So, a lot of our products on the energy side is used to reduce contaminants and pollution in the air. So, as the coal in a coal power plant burns, it obviously releases some pretty nasty things into the atmosphere, NO_x, SO_x, and those products are responsible for acid rain and other issues, such as climate temperature increases and things of that nature.

So, with a flue gas desulfurization nozzle, these are nozzles that go into the chimney or the flue of the smokestack and sprays a lime slurry into the smoke. And with that, it precipitates out the nitrates and the sulfates, so it doesn’t go airborne and they all fall to the bottom; you can dispose of them as solid waste at that point in time.

So, these silicon nitride nozzles had a significant mechanical requirement for use because the company that we were selling them to provides a warranty on the nozzles. So, if one of them breaks or if multiple of them breaks, it’s a major issue. So, there are significant mechanical testing as these are bolted down.

In order to overcome those requirements, one of my first things that I did was review and improve upon the silicon nitride synthesis of our products. So, we do everything in situ, meaning that our formation of silicon nitride is done in a kiln rather than being made as powder before and then sintered together as silicon nitride powders. We actually take reactant powders and fire them in a specific atmosphere that forms silicon nitride as it’s also being sintered and heated. So, reviewing that and upgrading the silicon nitride process, reviewing our materials, how we can improve upon the chemistry of that to enhance the silicon nitride genesis and development while being heat treated.

All those things kind of came together for a really nice project that not only was process improvement through the heat treatment cycles but also through the material itself and setting it up so it can really emphasize that nitridation reaction or reactions, there’s actually a couple that happened. So, with that, we were able to take our current product, which resulted in about 10% SiO_2 phase, and now we have a product with all silicon

nitride phase. And with that, we were able to not only meet the mechanical requirements, but there were also some thermal requirements as well.

Another one that we've just kind of put out on the aerospace side, we developed a [magnesium] alumina spinel for alkaline metal melts. And what's happening more and more is calcia is being introduced into molten metal melts for aerospace for cleaning purposes and other purposes as well. But when you introduce calcia or lime to those melts, there's a major influx of corrosion that can occur. That's highly problematic, obviously, for the containment areas. And most ceramics, most refractory ceramics, which are used in crucibles, are typically highly corrosive to alkali environments. They're great in acidic environments, but once that pH starts creeping up, it becomes much more and more problematic corrosion-wise.

So, to overcome that, we developed a spinel material that we were able to not only demonstrate the corrosion resistance to be similar to that of a magnesia brick but really have none of the drawbacks to a magnesia brick, in that the thermal expansion we were able to minimize and get more in line with a typical alumina than a magnesia; we were also able to maximize thermal shock resistance. So, with all that, we've been putting this into trials recently and have been having great success with that. So, that's real exciting."

McDonald: "The two examples that you gave are such perfect ways of demonstrating how modern manufacturing has evolved from a more standard 'take the materials as they are' perspective to a highly technical engineered industry where you're really like modeling these materials, looking at the interfacial interactions, to be able to develop these products that serve very niche and specific purposes."

DeCarlo: "Exactly. You know, that's where we primarily start. We're modeling things. You know, we're right next to RPI [Rensselaer Polytechnic Institute] with their supercomputers. We've worked a lot with their computer science department to utilize that time on their supercomputers to do some modeling efforts with COMSOL and other modeling programs as well.

And I will say, when someone asks me what type of ceramics we primarily manufacture, what we're doing is we are developing a solution for what our customer needs out of ceramic. So, it's an exciting kind of field to be in, and Blasch really leads the charge with that, and I'm excited to be a part of it."

(music)

BREAK

McDonald: "The American Ceramic Society's Manufacturing Division addresses the needs of manufacturers and the full value chain involved in the production of ceramic and glass components and products. Learn more about this Division at www.ceramics.org/manufacturingdivision."

SECTION 3

McDonald: “I know you’ve also helped lead the charge in other ways through The American Ceramic Society by helping us establish the Manufacturing Division as it exists today. Would you be able to tell us a little bit about the history of why you saw the need to like get this type of Division established, how you went about doing so, and what its current goals are?”

DeCarlo: “Sure, yeah. Back in January of 2015, Dr. Carty, then a professor at Alfred University and highly involved throughout his career in manufacturing, he reached out to me to help him start a Division of ACerS focused on manufacturers. You know, a Division where members are able to engage specifically with manufacturing ceramics as the topic.

Just as Basic Science [Division] has ties to all Divisions to discuss the fundamental science behind the ceramics, the thought is the Manufacturing Division would kind of have ties across all the Divisions focused on the practical manufacturing, commercialization of the respective ceramics. You know, asking questions, ‘How do we overcome flaws in electronic ceramic manufacture and reduce scrap rates?’ for example, ‘How do we engage in the next generation of ceramic engineers to take on industrial jobs and jobs outside of academia and or the national labs?’ And that was really exciting to me, and I know this is something that Dr. Carty wanted to get off the ground.

And we did it really quick. So, we had that discussion in January, and by April at Ceramics Expo, we kicked off the Division kind of through a broad meeting with a number of businesses, from Saint-Gobain to Blasch to CoorsTek. Everyone was there at Ceramics Expo, so it just worked out really nicely. And in that meeting, we kind of worked to develop a Division strategy, and we really identified I would say three gaps which helped define the strategy of the Division for years to come, really to this day.

So, the three gaps were we didn’t have enough ceramic engineers with practical experience. We had a lot of really great engineers coming up through school, or some experienced engineers that were highly involved in academia or the national labs, but the population of ceramic engineers that were involved in industry were really aging and we really needed to bring in the next generation to sustain what they helped develop. So, that was a big bullet point there.

Another thing we talked about is not only bringing in ceramic engineers and providing ceramic engineers with practical experience in their schooling but also taking the operators in these manufacturing businesses and helping to retrain them and helping them to understand why these things are being done in the manner that they are. Ceramics are really, there’s a lot to them, especially in the processing side. And one minor thing can throw the entire process off the rails; that’s a big issue. So, we wanted to have everyone have an appreciation, especially the people that are touching it every day and the operators.

And then the final one that we kind of identified, and a very important one, is the supply chain. The supply chain in ceramics is incredibly small, I would say. It's not the main purpose of these raw materials to go into the manufacturer of ceramics. For example, in the manufacture of alumina, you can kind of branch out at one point during that to manufacture aluminum. And that's where primarily all of the sub-raw material goes to; the alumina suppliers, we really only get a small portion of that. So, the first thing that those people, if they're having supply issues, the first thing that they're going to start weaning off and cutting off is the alumina suppliers.

So, there's a lot of interesting things that happen with the supply chain of ceramic raw materials. We wanted to make sure that the Manufacturing Division was a source for networking and discussion for ceramic manufacturers in that realm of manufacture, which is primarily the start of it. And then the end of it, being a part of that supply chain to someone in the aerospace industry, for example, it's very important that they don't shut down. You know, Boeing, I believe, has 10 years' worth of backlog on planes. They are just flat out making planes. So, one hiccup in that puts them out significantly.

Not to mention, that's the commercial side, not to mention the defense side, where if you're late in supplying the government, you lose the contract pretty much forever, you're no longer a government supplier. So, these things all are incredibly important, so we wanted to make sure that was something we hit on.

Moving forward to today, really the key is the collaboration across ACerS. We want to do that through working with the other Divisions, through collaborating with the other Divisions, and by providing quality technical programming for industrial participants of all disciplines.

Our Division recently includes an industrial tutorial program, which we did our first one at the past Spring Meeting in Bellevue, Washington, which was a success. It was actually Rehan from my company, my engineer Rehan Afzal, provided the industry tutorial through Blasch Precision Ceramics. And as a company, we're able to bring samples of newly commercialized products and discuss the efforts and the speed bumps that were encountered during the development of those products. That was a huge success to where we have two companies this year presenting as an industrial tutorial for the next Spring Meeting.

With that, though, the Manufacturing Division is always looking for new ideas on how to engage manufacturers and supporters of manufacturing in general. So, that's kind of the main goals of the Manufacturing Division. Probably not as succinctly as I could have put it, but I wanted to throw some ideas and examples out there as well."

McDonald: "Throwing those ideas and examples out there is exactly what we're talking about: Trying to brainstorm new ways of engagement, be that through the lecture at the Spring Meeting, which I know we're all looking forward to in May 2027, and another one we haven't had the chance to touch on yet is publications.

So, The American Ceramic Society has different ways for members to engage outside of face-to-face meetings by publishing in academic journals, in the *ACerS Bulletin* membership magazine, even engaging through audio platforms such as the podcast that we're doing now.

So this year, you're our current chair of the Publications Committee. So, can you tell us a little bit about how you got involved with that committee and what your viewpoint is with publications being able to support some of these initiatives and cross collaborations?"

DeCarlo: "I actually got involved in the Publications Committee through we used to have a Books Committee. So, I was on the Books Committee, in which we kind of reviewed and worked with Wiley, our publisher, to come up with new ideas for books, review submissions for book ideas, etcetera. So through that, I was able to kind of step up and become a part of the Publications Committee, which I'm now chair of.

And the Publications Committee, you know, I was not aware of all of the things that they do, to be honest with you. There's a lot of behind the scenes work that takes place. There's a wide variety of topics that the Publications Committee tackles; it's more than just the technical content. The Publications Committee is responsible for the administration of the various publications of the Society: how it's formatted, publication policies. We're involved in hiring new editor-in-chiefs. It's very much a connection between the current editor-in-chiefs of the various journals, the *Bulletin*, and other communication aspects to the Board of Directors. So, we work with everyone in that capacity to integrate the Society's strategy with the publications and the communications that everyone leads.

One of our biggest topics, I will say, right now, and we talked about this at length at MS&T during our Publications Committee meeting there, and during a strategy meeting the Monday following, is AI [artificial intelligence]. You know, is there a place for AI in scientific publishing and communication. It's a really difficult question. We believe that there is a place for it, however, you really need to limit the scope. You can't have AI fully write an article or have AI make conclusions on the data. That has to come from a human being and someone that's trained in the science. And we are currently developing an AI policy to address its use.

So, it's really exciting because you're involved in every aspect of the Society. It's an exciting place to be."

McDonald: "It definitely is. In many ways, communications is the heartbeat. It's the discussion platform that lets all of our members come together and talk through these things."

DeCarlo: "Yes, one hundred percent."

(music)

CONCLUSION

McDonald: “There are many ways to support the goals of your community, and finding the mechanism that fits you best will allow you to participate gladly and fruitfully for years to come.

I’m Lisa McDonald, and this is Ceramic Tech Chat.”

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“Visit our website at ceramics.org for this episode’s show notes and to learn more about Keith DeCarlo, the Manufacturing Division, and the Publications Committee. Ceramic Tech Chat is produced by Lisa McDonald and copyrighted by The American Ceramic Society.

Until next time, I’m Lisa McDonald, and thank you for joining us.”