American Chemical Society AMA: Hi! We're Lisa Jarvis and Melody Bomgardner of Chemical & Engineering News, here to discuss the chemistry and business smarts behind C&EN's Ten Start-ups to Watch. AUA!

AmerChemSocietyAMA [1] and r/Science AMAs[1]

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Abstract

Hi, I'm Lisa Jarvis, Senior Correspondent for C&EN. I cover the pharmaceutical industry, and routinely write about young biotech companies that have spun out of academic labs. For C&EN's Ten Start-ups to Watch, I helped generate a long list of start-ups worth considering and, along with Melody and our editor Mike McCoy, pared those down to the 10 "winners." Now taking suggestions for start-ups with chemistry at their core to consider for next year's feature. Hi, I'm Melody Bomgardner, Senior Business Editor for C&EN. I primarily cover the so-called cleantech sectors–along with agriculture and food topics–for the magazine. Start-ups are rather common in the cleantech industries and, increasingly, in agriculture. I love talking to entrepreneurs about how they go from discoveries in the lab to creating a sustainable business. The result of our searching and winnowing appeared in the Nov. 2 issue. C&EN profiled 10 start-ups working across a wide range of fields—from agriculture to biotechnology to materials science and beyond. The list includes Padlock Therapeutics, Carbon3D, Liquid Light, and Nohms Technologies. Whether they're trying to treat a debilitating disease or extend the life of your cell phone battery, these companies are united by a common theme: They all are using groundbreaking chemistry to solve real-world problems. Some have substantial backing from venture firms or corporate partners; others are still working to validate their technology. We arrived at this diverse collection by polling knowledgeable staffers, scouring databases of start-ups, and asking tuned-in sources for recommendations. We'll be back at 1:00 pm EST(10 am PT, 6 pm UTC) to start answering questions. EDIT: It's 1pm EST, and we're live. Melody and I will be here for an hour to answer your question. EDIT: Thanks, all! It's 2pm EST and Melody and I are signing off. If you haven't, check out the profiles of the ten companies we think are worth keeping an eye on: http://cen.acs.org/articles/93/i43/10-Start-Ups-Watch.html

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ABSTRACT

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Out of the 10 Start-ups which one do you see affecting and reaching people in their everyday lives the fastest? and how/why would that start-up do it?

Thanks!

ProudTrumpSupporter

Good question! The thing to remember about young companies is there can be a long lead time before the technology or product they're working on reaches the market. This is especially true for start-ups working on new drugs, where it can take years to get a drug through all the necessary regulatory hurdles. That said, a few companies on our list are much closer to reality. I'd highlight Carbon3D ((http://cen.acs.org/articles/93/i43/Carbon3D.html) as one that has some potentially game changing technology that could make a real impact sooner rather than later. In addition to reading Matt

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Davenport's great write-up, I'd encourage you to check out the awesome TED talk that Carbon3D founder Joe DeSimone did earlier this year (http://www.ted.com/talks/joe_desimone_what_if_3d_printing_was_25x_faster). What I like about this isn't just the cool Terminator-like effects, but that this technology could be useful across so many industries. Another one that is potentially not too far off from commercialization is SLIPS Technologies (http://cen.acs.org/articles/93/i43/SLIPS-Technologies.html). Here's what I like about SLIPS: They're working on technology that isn't super sexy in the scheme of things—slippery surfaces—but could have a real impact on energy use. If you could prevent barnacles and bacteria from gumming up the bottoms of boat ships, for example, you'd need less fuel to power that ship. We focus a lot on ways to generate cleaner energy, which is important, but I like seeing these kinds of technologies that make us more efficient.--Lisa J.

Out of the 10 Start-ups which one do you see affecting and reaching people in their everyday lives the fastest? and how/why would that start-up do it?

Thanks!

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What Lisa J. said! Another thing that is important to note is that most of these technologies will reach consumers not directly, but through companies that choose to work with, license, or perhaps even acquire the start-ups that we featured. That said, I would say that consumers may soon start to see spider silk fabrics (Bolt Threads: http://cenm.ag/boltthreads), longer-life lithium ion batteries (Nohms: http://cenm.ag/nohms), and new packaging with slippery surfaces in the inside – or products with slippery non-fouling surfaces (Slips Technology).

Already, Bolt Threads has a competitor called Spiber that partnered with the North Face to make a spider-silk fabric jacket .

Do you have any advice on how I would determine if the project I am working on is something that would likely be able to be translated to a company? What types of things do you look for to determine if an academic project has a good chance to be the basis of a successful company?

kerovon

Asking that question is the first step!

Steve Jobs was famous for developing products that solved problems his customers didn't even know they had – who knew you needed an iPod to carry your music around?

In contrast, what generally moves a discovery out of academia and into the market place is that it helps to solve a known problem. Cell phone batteries go kaput at the worst times. Doing synthetic biology by cloning is tedious and takes time away from doing more experiments. Packages like paint cans that do not release all of their contents waste money and resources. When you hear people complain, that is a business opportunity!

Sometimes you have to look far afield to find the right problem to solve with your technology. The folks at the agriculture start-up Provivi (http://cenm.ag/provivi) developed a way to get nature to lend a hand in synthesizing complex molecules. But they had to pick a market to get start-up funding – and that was a project in itself. They chose to focus on making duplicates of insect pheromones. The problem to solve? Insect pheromones are a natural way to protect crops but are too expensive for routine use.

If you think your work contains a potential business idea to solve a problem, see if you can meet with

the folks at your university who handle technology transfer. They can tell you about some recent successes and what they look for. But don't stop there – find some local start-up pitch meetings and observe them.

Melody B.

Having worked in industry for many years, a number of the funding amounts for these startups seem really low. The numbers seem high if you are thinking about an academic grant or in terms of personal finance, but in terms of lab operation in industry, it's not much.

The cost of a lab chemist, classically, is in the ballpark of $350,000, including salary, benefits, lab facilities, and assorted bits.

Add to that the cost of legal, and administration, you're probably only talking enough funds for 3-4 people. That seems tight.

Are these organizations working out of existing facilities, like a university lab?

nallen

Re: start-up funding amounts, these vary across industry, of course. Some of these companies are building bricks and mortar labs and hiring—I'd point to Revolution Medicines, Carbon3D, and Bolt Threads as being a good example of that. But some also either started out or are still working in incubators, where you might have lower overhead because you are sharing resources with other companies. But I'd also note that some firms choose to maintain a smaller footprint despite sizable funding because they want to deploy their financial resources wisely—so they work with contract research firms and add staff only where they feel like its truly important to have that expertise in-house. Of the companies on our list, Padlock Therapeutics is a good example of that approach. --Lisa J.

So in general, what are the common trends in chemistry start-ups? Any big-data + science start up on your radar?

meruapps

For the feature story, Lisa and I specifically looked for companies with "out of the lab"-type chemistry innovations. But certainly big data is an important trend in start-ups as is that new world of the internet of things. In the agriculture industry, big data, drones, sensors, satellites, and even robots are making a big splash in so-called "precision agriculture." Look for big data start-ups in genomics (and particularly the burgeoning field of metagenomics), energy efficiency and management, and materials design. It's probably harder to think of a scitech area that ISN'T being impacted by big data approaches than to find one that IS. Melody B.

Going in the opposite direction of the start ups to watch, are there any particular common characteristics among the start ups that fail?

IceBean

Why do start-ups fail? Some obvious reasons are a technology just not working or lack of funds. I suppose there's a deeper question there about why a company fails to raise money—in that case it might be that they're just not going after a problem that investors think needs solving, or aren't broaching it in the right way, or haven't focused on the right application for their technology. You might want to check out the profile of Provivi (http://cen.acs.org/articles/93/i43/Provivi.html). One of the

founders of that company was a graduate student and there was a learning curve—one they were able to overcome--about how to turn a cool technology into a business. –Lisa J.

What issue do you think the current chemistry startups are not able to focus on?

mighty_bitch

This question stumped me! I was quite surprised to find that start-ups with innovative chemistry are targeting such a wide variety of "problem spaces." It seems like they are carrying the burden for those of us who want to see innovation in something other than mobile apps. I'd love to see even more chemistry-based start-ups with plans to disrupt the food market (there are some fascinating small companies in this space but more would be great). I'd also love to see start-ups tackle agriculture in places where people do a lot of subsistence farming. Melody B.

My question is: I am a sophomore Chemistry major. Based on what is in demand (especially for start ups), should I switch to another similar major like biochem, materials chem, chemical engineering, physics?

kmethridge2

The companies we profiled have chemistry at their core, so I wouldn't dissuade you from the field. But I'd also encourage you to consider that most (all?) have an interdisciplinary angle. Happy to suggest a few articles from C&EN's coverage that might give you an idea of where the jobs are and are going, and would also point you to Chemjobber blog's (http://chemjobber.blogspot.com/), where there's an ongoing discussion of job trends. I'd note that geography can matter as much as discipline. For example, jobs exist for medicinal chemists, but they're a lot easier to find in, say, Boston, than Chicago.--Lisa J.

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kmethridge2

As a sophomore you have plenty of time! I would suggest putting serious thought into which areas of chemistry or multidisciplinary science you are or might be really passionate about. That doesn't mean you need to change majors but when you have some electives, you can use those to explore. More important, find out about undergraduate research opportunities - even outside the core chemistry department. Your knowledge of chemistry and lab skills will likely be in demand. See your academic adviser! -Melody B.

Do you have a list of companies that were in contention for making this list? I work in materials chemistry, but I'm looking companies in all fields chemistry.

Tanjacket

We do, but.... we are holding onto 'em. Some of those companies were really promising, but not quite ready for prime time and will be considered again next year. --Lisa J.

Do you have a list of companies that were in contention for making this list? I work in materials chemistry, but I'm looking companies in all fields chemistry.

Tanjacket

Yes, we were able to compile an original list of about 40 firms that we evaluated based on a bunch of criteria. Some will stay in contention for next years' feature - so I probably won't share the list on a public forum!

If you find any start-ups that you think we should look into please let us know! You can e-mail me at m_bomgardner [at] acs [dot] org