

## *Print Your Own Medicine*

By Lee Cronin

Organic chemists make molecules, very complicated molecules, by chopping up a big molecule into small molecules and reverse engineering. And as a chemist, one of the things I wanted to ask my research group a couple of years ago is, could we make a really cool universal chemistry set? In essence, could we "app" chemistry?

Now what would this mean, and how would we do it? Well to start to do this, we took a 3D printer and we started to print our beakers and our test tubes on one side and then print the molecule at the same time on the other side and combine them together in what we call reactionware. And so by printing the vessel and doing the chemistry at the same time, we may start to access this universal toolkit of chemistry.

Now what could this mean? Well if we can embed biological and chemical networks like a search engine, so if you have a cell that's ill that you need to cure or bacteria that you want to kill, if you have this embedded in your device at the same time, and you do the chemistry, you may be able to make drugs in a new way.

So how are we doing this in the lab? Well it requires software, it requires hardware and it requires chemical inks. And so the really cool bit is, the idea is that we want to have a universal set of inks that we put out with the printer, and you download the blueprint, the organic chemistry for that molecule and you make it in the device. And so you can make your molecule in the printer using this software.

So what could this mean? Well, ultimately, it could mean that you could print your own medicine. And this is what we're doing in the lab at the moment.

But to take baby steps to get there, first of all we want to look at drug design and production, or drug discovery and manufacturing. Because if we can manufacture it after we've discovered it, we could deploy it anywhere. You don't need to go to the chemist anymore. We can print drugs at point of need. We can download new diagnostics. Say a new super bug has emerged. You put it in your search engine, and you create the drug to treat the threat. So this allows you on-the-fly molecular assembly.

But perhaps for me the core bit going into the future is this idea of taking your own stem cells, with your genes and your environment, and you print your own personal medicine.

And if that doesn't seem fanciful enough, where do you think we're going to go? Well, you're going to have your own personal matter fabricator. Beam me up, Scotty.  
(Applause)

*Print Your Own Money*  
Checking for Understanding

1. Please summarize the key ideas of this piece.
2. What are some analogies or comparisons that Lee Cronin used to explain his “really cool universal chemistry set”?

Vocabulary

- universal
- deploy
- molecular
- ultimately
- chemist
- chemists
- fanciful
- network
- manufacture
- biological

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