

Click chemistry makes fusilli-shaped polymer

A new method that WUR helped develop produces polymers shaped like fusilli pasta quickly and efficiently.

The method in question is an example of what is termed 'click chemistry'. That is chemistry where the individual components click together like Lego bricks, explains professor of Organic Chemistry Han Zuilhof. In this case to form a polymer (for example plastics), a long chain of identical molecules, arranged like beads on a string.

'The polymer acts like a platform that you can click all kinds of things onto'

The basis of the chain is the small molecule SOF₄, a compound in which one atom of sulphur is doubly bonded to one atom of oxygen (S=O) and singly to four fluorine atoms (S-F). In the monomer, the beads in the chain, two of those S-F groups function as a kind of hook, explains Zuilhof. 'One of those hooks is used to attach the individual monomers to one another. The other hook is then available to click onto other molecules.'

That sequence is essential. Zuilhof: 'The hooks react one after the other. The polymer chain is created first and only then can we attach things to it. That avoids any cross-linkages that

would cause a mess.' That sequence makes the method an interesting option for practical applications. 'The polymer acts like a platform that you can then click all kinds of things onto very efficiently,' says Zuilhof.

Pretty

At the nano scale, the polymer molecules look like fusilli pasta. Put more scientifically, they are helical. That structure was determined by Zuilhof's WUR colleague Sidharam Pujari. It is not yet clear whether the fusilli shape has benefits, says Zuilhof. 'What you can say is that it's pretty, but at present it's just a feature.'

Zuilhof explains that the new technique lets scientists 'make new materials rapidly and in a controlled way under mild reaction conditions.' Zuilhof's group is also doing this but he doesn't want to say more at this point. 'It took nearly two years before the publication was accepted, and we've made advances in the meantime.' ^{RK}

