Gel study uncovers unexpected dynamics

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Research by scientists at the University of York has revealed important new information about the dynamics of bacterial gels which could ultimately suggest new ways of helping prevent or better control diseases such as cystic fibrosis.

The research in the Department of Chemistry at York demonstrated that alginate gels, which can be produced as biofilms by bacteria such as pseudomonas aeruginosa, are more dynamic than previously thought. The research, which is published in *Soft Matter*, was funded by the Royal Society.

Understanding the dynamics of alginate gels may ultimately suggest new ways of helping prevent or better control such bacterial infections, which can be particularly critical in the lungs of cystic fibrosis patients.

Dr Victor Chechik and Professor David Smith, working with visiting Romanian scientist Dr Gabriela Ionita, used electron paramagnetic resonance methods to gain a detailed insight into these materials. The sticky alginate gel biofilms are composed of a combination of positively charged metal ions and negatively charged alginate polymers. It was well-known that the positively charged metal ions in these materials were mobile, but it was thought that the negatively charged alginate polymers acted as a relatively rigid and immobile framework holding the gel network together. The scientists used 'spin-labelling' methods to find that the alginate polymers actually had high levels of mobility and could readily exchange with one another.

Dr Chechik said: "The unexpected, highly dynamic and exchangeable nature of the alginate polymers in these materials suggests ways in which such gels could, in the future, be modified or disrupted."

Professor Smith added: "This fundamental research may allow the introduction of additional function to these dynamic soft materials, or even suggest new ways of helping disrupt alginate-producing bacterial infections such as pseudomonas aeruginosa."

More information: "Ion exchange in alginate gels – dynamic behaviour revealed by electron paramagnetic resonance," *Soft Matter*, 2015, Advance Article, DOI: 10.1039/C5SM02062J

Provided by University of York

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