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Dr Maureen Callow BSc, PhD

Honorary Senior Research Fellow

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About

Maureen Callow is a leading expert in the area of biofouling (deterioration of artificial surfaces through the attachment of organisms), in particular fouling of ships' hulls by algae. In recent years, research has focussed on understanding the processes of settlement and adhesion of algal cells to environmentally benign antifouling coatings, through collaborations with chemists and surface engineers. This research has been funded for the past 15 years by the US Office of Naval Research and more recently through two EC-funded programmes. Maureen Callow is an editor of *Biofouling*, the Journal of Bioadhesion and Biofilm Research.

Qualifications

BSc, PhD

Biography

Maureen Callow obtained a BSc and PhD in Botany from the University of Sheffield in 1967 and 1070, respectively. From 1970 – 1993, Maureen Callow was a research fellow funded by International Paints, first at the University of Leeds and from 1983 at the University of Birmingham. During this period, she was responsible for the biological evaluation of antifouling agents and surfaces for International Paint. Since 1993, her post has been funded by a number of organisations, notably the US Office of Naval Research. She was project manager (2005-2010) of the interdisciplinary 6th Framework Integrated Project 'AMBIO' (Advanced Nanostructured Surfaces for the Control of Biofouling) and is involved in s similar role in the Marie-Curie Initial Training Network 'SEACOAT' (Surface Engineering for Antifouling-Advanced Coordinated Training).

Dr Callow is known internationally in the area of biofouling and fouling control. Research interests include the control of marine biofouling, especially ship-fouling, by both biocidal and non-biocidal technologies; the development of bacterial and algal biofilms in aquatic and aerial environments; the biology of settlement, adhesion and colonisation of substrata by algal cells and spores; the measurement of strengths of attachment of algal spores and diatoms to substrata including foul-release coatings.

Dr Callow is an editor of the international journal *Biofouling* and has presented papers and posters at all major International Congresses in the area of Biofouling. She has authored or co-authored over 100 papers in the area of biofouling.

Research

Research Theme within School of Biosciences: Organisms and Environment

Lab website address: **www.biosciences-labs.bham.ac.uk/callowj/ent/ (http://www.biosciences-labs.bham.ac.uk/callowj/ent/)**

Research areas:

- Algal settlement and adhesion including novel approaches to biofouling
- Nanotechnology in the context of biological adhesion (collaborative interdisciplinary approaches with chemists and materials engineers).

Biofilms and bioadhesion

Biofouling of marine structures, especially by algae. The adhesion of algal spores, young plants and diatoms to surfaces and hydrodynamic evaluation of strength of attachment to novel antifouling and foul-release coatings. High throughput screening of potential antifouling and anti-adhesion compounds and novel surfaces. Much of our research is interdisciplinary and involves collaborations with European scientists in EC-funded projects and in the Office of Naval Research (USA) biofouling programme.

Research focuses on three types of marine algae that cause biofouling problems on the hulls of ships; the green seaweed *Ulva*, the brown seaweed *Ectocarpus*, and diatoms (unicellular algae).

We use these as model organisms to investigate bioadhesion processes in relation to biofouling. Work involves interdisciplinary collaborations with surface scientists, physicists, nanotechnologists and polymer scientists in the US and Europe. To study surface selection cues involved in the recruitment of our test organisms we use well-characterised surfaces that provide different physico-chemical properties e.g. wettability, charge. We are particularly interested in nano- and microtopographic modifications of surfaces. Adhesion strength of attached cells is measured hydrodynamically using calibrated flow cells and water jets. The research is generating novel insights into how the settling stages of the test organisms organisms detect and respond to surface cues and this information is then used in knowledge-driven approaches to the development of practical antifouling coatings.

Other activities

Editor of *Biofouling*, the Journal of Bioadhesion and Biofilm Research.

Publications

- Callow JA, Callow ME. 2011. Trends in the development of environmentally friendly fouling-resistant marine coatings. Nature Communications 2:

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- Beigbeder A, Mincheva R, Pettitt M E, Callow M E, Callow J A, Claes M, Dubois P. 2010. Marine fouling release silicone/carbon nanotube nanocomposite coatings: on the importance of the nanotube dispersion state. J Nanoscience and Nanotechnology 10: 2972-2978.
- Long CJ, Finlay JA, Callow ME, Callow JA, Brennan AB. 2010. Engineered antifouling microtopographies: mapping preferential and inhibitory microenvironments for zoospore attachment. Biofouling 26 (8): 941-952.
- Sommer S, Ekin A, Webster DC, Stafslien S, Daniels J, Wal LV, Thompson SEY, Callow ME, Callow JA. 2010. A preliminary study on the properties and fouling-release performance of siloxane-polyurethane coatings prepared from pol(dimethylsiloxane) (PDMS) macromers. Biofouling 26 (8): 961-972.
- Callow JA, Callow ME. 2009. Advanced nanostructured surfaces for the control of marine biofouling: the AMBIO project. In Advances in marine antifouling coatings and technologies. Eds Hellio C, Yebra D. Woodhead Publishing, Great Abington, UK pp764.

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