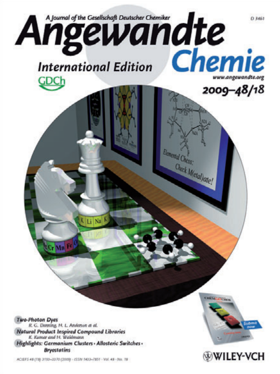
Author Profile

R. Mulvey

Robert Mulvey

Date of birth: December 13, 1959
Position: Professor and 1919 Chair of Inorganic Chemistry, University of Strathclyde, Glasgow (Scotland)
E-mail: r.e.mulvey@strath.ac.uk
Homepage: http://www.chem.strath.ac.uk/people/academic/robert_e_mulvey
Education: 1977–1981 BSc, 1st Class Hons, University of Strathclyde
1981–1984 PhD with Ron Snaith, University of Strathclyde
1984–1986 Postdoc with Ken Wade, University of Durham (England)
Awards: **1984** University of Strathclyde Ritchie Prize; **1986** Royal Society 1983 University Research Fellowship; **1988** Royal Society of Chemistry Meldola Medal; **2001** Fellow of the Royal Society of Edinburgh; **2001** Royal Society of Chemistry Main Group Element Award; **2002** Fellowship of the Royal Society of Chemistry; **2004** Royal Society Leverhulme Trust Senior Research Fellowship; **2009** Royal Society Wolfson Research Merit Award
Current research interests: We are developing the special synergic or synergistic chemistry that can be triggered through the cooperative effects of combining two distinct components (usually metals) within the same organic environment. Fundamentally one could say that mixing two distinct metals, for example sodium and magnesium, produces a mixed-metal molecule or ate (to us, a fascinATE), which acts neither as a sodium nor a magnesium compound but a compound of a unique new metallic element! Novel chemistry, beyond the scope of conventional homometallic reagents, is the prize. Applying this idea to metalation chemistry, in alkali-metal-mediated metalation the alkali metal is the catalyst while the formally less reactive metal (e.g., magnesium, zinc) performs the deprotonation. This synergy often results in inverse crown macrocycles.
Hobbies: Writing, chemistry, traveling, watching Glasgow Celtic FC, dining out, coffee shops

*The author presented on this page has published more than **25articles** since 2000 in Angewandte Chemie, most recently:* "'$LiZn(TMP)_3$', a Zincate or a Turbo-Lithium Amide Reagent? DOSY NMR Spectroscopic Evidence":P. García-Álvarez, R. E. Mulvey, J. A. Parkinson, *Angew. Chem.* **2011**, *123*, 9842–9845; *Angew. Chem. Int. Ed.* **2011**, *50*, 9668–9671.



The work of R. Mulvey has been featured on the cover of Angewandte Chemie: "Direct C–H Metalation with Chromium(II) and Iron(II): Transition Metal Host/Benzenediide Guest Magnetic Inverse-Crown Complexes": P. Alborés, L. M. Carrella, W. Clegg, P. García-Álvarez, A. R. Kennedy, J. Klett, R. E. Mulvey, E. Rentschler, L. Russo, *Angew. Chem.* **2009**, *121*, 3367–3371; *Angew. Chem. Int. Ed.* **2009**, *48*, 3317–3321.

A good work day begins with … telling a student that their paper has just been accepted, especially if it is for *Angewandte Chemie*.

What I look for first in a publication is … that surprise element that we all strive for in our own studies.

If I won the lottery, I would … buy a penthouse loft flat in New York City with a fantastic view of the skyscrapers, and with spare rooms so family, friends, and members of my research group could take turns at visiting me.

My favorite place on earth is … anywhere beside my partner Barbara, but the Isle of Skye (Scotland) and Maui (Hawaii) are hard to beat.

My secret/not-so-secret passion is … composing a draft paper over a grande latte and chocolate cake in a lively coffee shop.

My greatest achievement has been … bringing the idea of synergy to the forefront of alkali metal chemistry. Many excellent groups have contributed to the development of mixed-metal chemistry but we have been explicit about the cooperative effects at work.

My biggest motivation is … the love and respect of my family and friends. I also enjoy mentoring younger colleagues and students.

Guaranteed to make me laugh is … watching any old episode of the sitcom Seinfeld (a reality university sitcom would be funnier still).

The downside of my job is … not having enough time to do everything you want to do or as well as you know you could do.

The most amusing chemistry adventure in my career was … forgetting to turn off the argon inlet to the neoprene gloves on my glove box and returning to the laboratory to find the gloves nearly filled the whole room. Scary at the time, but a good story for the pub afterwards.

My favorite food is … generally Japanese as it is bursting with delicious flavors, full of exotic ingredients and comes in reasonably sized (small) portions.

My favorite song is … anything from the catalogue of the Beatles ("The Long and Winding Road" seems apt).

Has your approach to publishing your results changed since the start of your career?

When I was younger, I was eager to publish our results as quickly as possible. This helped me to hone my technique in writing communications. I think it is a particular skill and challenge to be able to write concisely yet informatively and at the same time to be able to pick out the essential points of a study and present them in creative and imaginative ways. For that reason, *Angewandte Chemie* and *Chemical Communications* have always been my favorite journals. I also think it is important to be realistic about the significance of your own work by sending manuscripts to appropriate impact-level journals and not aiming too high unless the results justify it. Writing up the most exciting results for the best journals has to be a priority but hard-working students producing more routine results deserve to be rewarded with nice publications too.

What do you think the future holds for your field of research?

Fundamental chemistry, the seed from which numerous important applications and technologies have grown, is currently getting squeezed for funding and moreover there is a climate of dictation on which areas to study from the bureaucrats, who hold the purse strings. Optimistically I believe that chemists are an ingenuous lot and that fundamental chemistry and alkali metal organometallic chemistry will continue to grow and reach new heights not yet imagined. Transforming all stoichiometric reactions into catalytic reactions and performing all organometallic chemistry in water are two grand challenges, which I think may start to be met over the next decade or so. Inspiring young people to appreciate and have an interest in science and chemistry will always be the major key to the future of research.

My 5 top papers:

1. “Crystal-structures of $(Ph_2C{=}NLi\cdot NC_5H_5)_4$ and $[ClLi\cdot O{=}P(NMe_2)_3]_4$; discrete tetrameric pseudo-cubane clusters with bridging of Li_3 triangles by nitrogen and by chlorine atoms”: D. Barr, W. Clegg, R. E. Mulvey, R. Snaith, *J. Chem. Soc., Chem. Commun.* **1984**, 79–80.
   My first paper and from that moment on I have been hooked on research chemistry and writing papers. Done in collaboration with Ron Snaith, a fantastic and altruistic mentor, this work described the cubane structures of two novel Li–N and Li–Cl tetramers. It was the first of a series of papers that eventually led to the development of the “ring-stacking and ring-laddering principles” in organolithium chemistry.
2. “Regioselective Tetrametalation of Ferrocene in a Single Reaction: Extension of s-Block Inverse Crown Chemistry to the d-Block”: W. Clegg, K. W. Henderson, A. R. Kennedy, R. E. Mulvey, C. T. O'Hara, R. B. Rowlings, D. M. Tooke, *Angew. Chem.* **2001**, *113*, 4020–4023; *Angew. Chem. Int. Ed.* **2001**, *40*, 3902–3905.
   Previously, no known organomagnesium reagent could deprotonate a metallocene, but here we show that using a synergic sodium–magnesiate reagent, ferrocene could be deprotonated not once, but four times. The outcome of this remarkable regioselective tetramagnesiation was a new 16-membered inverse crown ring structure.
3. “Synergic Sedation of Sensitive Anions: Alkali-Mediated Zincation of Cyclic Ethers and Ethane”: A. R. Kennedy, J. Klett, R. E. Mulvey, D. S. Wright, *Science*, **2009**, *326*, 706–708.
   This paper demonstrated that zinc reagents generally regarded to be poor bases can exhibit greatly enhanced deprotonating abilities when combined with sodium or potassium and that the sensitive ether or vinyl anions generated by such Zn–H exchanges can be stabilized through cooperative bimetallic bonding.
4. “Directed *meta*-Metalation Using Alkali-Metal-Mediated Zincation”: D. R. Armstrong, W. Clegg, S. H. Dale, E. Hevia, L. M. Hogg, G. W. Honeyman, R. E. Mulvey, *Angew. Chem.* **2006**, *118*, 3859–3862; *Angew. Chem. Int. Ed.* **2006**, *45*, 3775–3778.
   Metalation of substituted aromatic compounds usually occurs at the *ortho* position. Disobeying this doctrine, this study reveals that deprotonation of anilines can be deflected to a *meta* site using a bimetallic reagent.
5. “Cleave and capture chemistry illustrated through bimetallic-induced fragmentation of tetrahydrofuran”: R. E. Mulvey, V. L. Blair, W. Clegg, A. R. Kennedy, J. Klett, L. Russo, *Nature Chemistry* **2010**, *2*, 588–591.
   In the antithesis of the “sedation” story in the *Science* paper cited above, switching to a different bimetallic reagent leads to a catastrophic cleavage of THF, breaking six of its total 13 bonds. All the fragments are captured in novel crystalline bimetallic products.

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