Final NanoSpace WG4 Meeting Report

2nd Working Group 4 Meeting - Cardiff Metropolitan University, 2nd - 5th June 2026

Participants

In-Person:

Simon Scarle (SS), Cardiff Metropolitan University, UK (local organiser)
Ian Smith (IS), Cardiff Metropolitan University, UK
Chris Ewels (CE), CNRS-IMN, France
Eleanor Campbell (EC), University of Edinburgh, UK
Gaëtan Clément (GC), Institut des sciences moléculaires d'Orsay, Orsay Cedex, France
Cedric Doutriaux (CD), Centre National de la Recherche Scientifique, Nantes, France
Ed Goldwyn (EG), Goldwyn Assoc. Ltd, UK
Ilija Rašović (IR), University of Birmingham, UK
Josh Griffiths (JG), Cardiff Metropolitan University, UK
Lukas Hrubcik (LH), University of Chemistry and Technology Prague, Prague, Czechia

Online (confirmed/expected): Flavia Dell'Agli (e-mail/WhatsApp), Alessandra Candian (Tuesday zoom, and WhatsApp), and the NanoSpace PhD students Tom Douglas-Walker and Olivia O'Neill (Wednesday zoom; Cheminoes feedback)

Overview

The meeting was held at the Cardiff School of Technologies, Llandaff Campus, and it was more focussed than the first meeting; i.e., less open-ended, with participants arriving with concrete tasks in progress and a shared goal of finishing things rather than generating new ideas. The group worked hard across four days.

Day 1 - Tuesday 2nd June

Welcome and coffee from noon at the Nexus (F-Block), followed by lunch at the University Refectory. Simon and Chris introduced the meeting plan and breakout group structure. The afternoon was devoted to progress presentations:

- Ilija Rasovic (IR) / Buckyballs from Spaceship Earth map update and feedback from SIU Carbondale

- Chris Ewels (CE) / Cheminoes update

- Ian Smith (IS) & Ed Goldwyn (EG) / update on the "Life on Earth" board game

- Simon Scarle (SS) & Josh Griffiths (JG) / update on BuckyBert

Evening social at On the River (59 Despenser St, Cardiff CF11 6AG).

Day 2 - Wednesday 3rd June

Morning breakout groups from 9:30 in room O1.16. Lunch at the Maltsters Arms in Llandaff. Afternoon included a zoom call with the NanoSpace PhD students Tom Douglas-Walker and Olivia O'Neill (University of Edinburgh), who had been independently testing Cheminoes and gave positive feedback. In the afternoon there was significant "cross-pollination" between the breakout groups, which really helped push some of the outputs close to completion.

Evening social at The Mount Stuart (JD Wetherspoon), Cardiff Bay.

Day 3 - Thursday 4th June

Full day of breakout group work. Post-lunch (14:00), IR and CE ran a trial of the Fullerene-ISM School Game with participants.

Evening conference banquet at Maison du Boeuf (21 Castle Arcade, Cardiff CF10 1BU), private dining room.

Day 4 - Friday 5th June

Zack Collins (Manifold Games joined us this day). Final presentations from all groups in the Learning Lab (F-Block) from 10:00, followed by collective forward planning and "next steps" decisions for each deliverable. Lunch at the Refectory to close.

Meeting Outcomes

1) Cheminoes: a domino-like game for constructing molecules. Major progress this meeting:

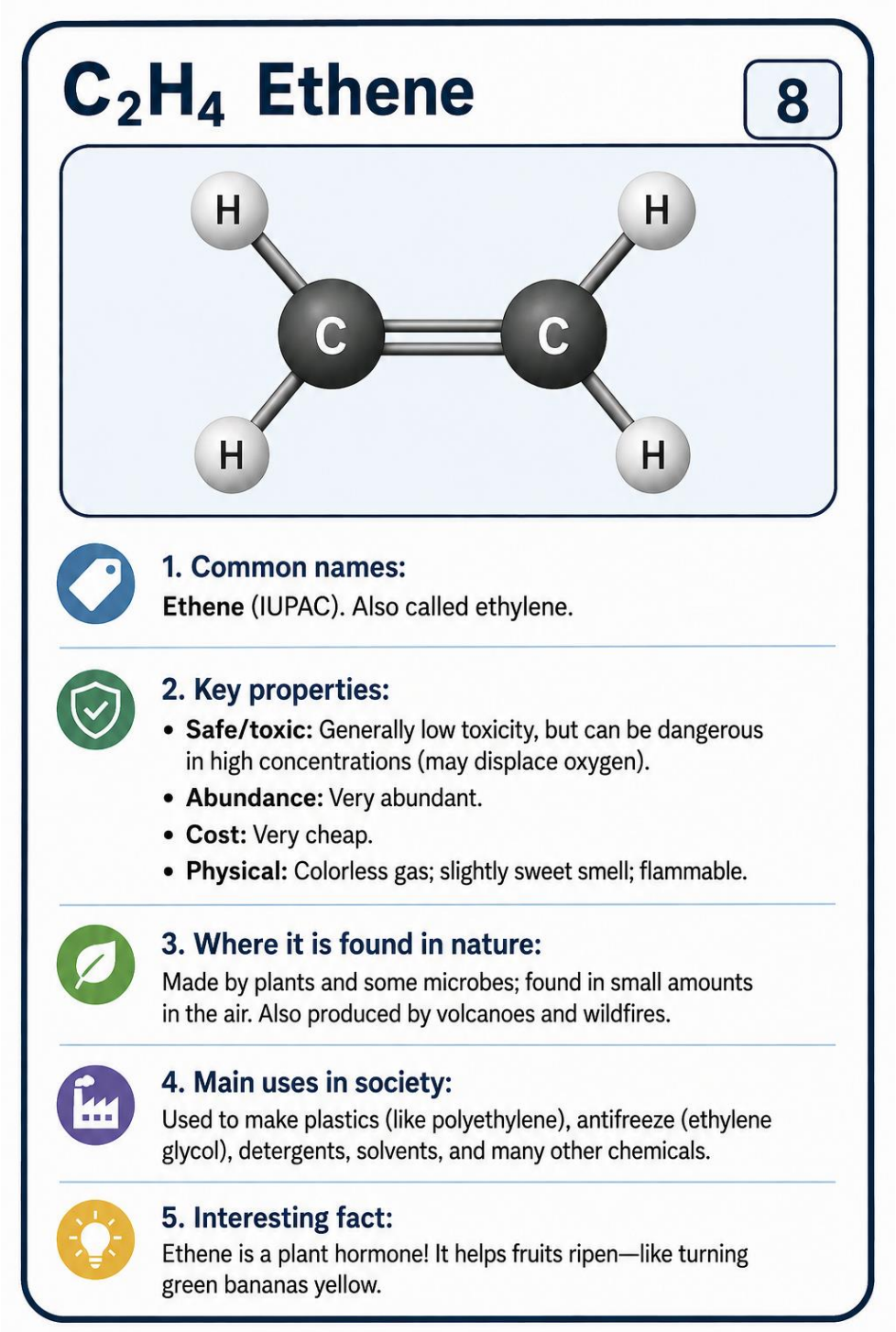
- At least one fully playable game concept agreed, with tile ratios confirmed and a "solution" for all tiles. ESB (contact Jean-Loup) can now be commissioned to build the ~40 remaining sets.

- Many ideas for game extensions developed. Box design advanced. Will be playable and demonstrated at Tenerife during the Final Joint Scientific Meeting next 15-17 September 2026.

- Positive feedback from Edinburgh PhD students Tom Douglas-Walker and Olivia O'Neill (who had been independently testing it) via zoom.

- Detailed website plan developed, covering multiple game variants and downloads, 3D printing files (CD has developed plans for both 3D printing and laser-etching from wood), origami folding instructions, simple printable PDF versions, and the luxury physical kit.

- The molecule card format (illustrated by the attached C_2H_4 Ethene card, card #8 below) shows the intended design: molecular structure diagram, IUPAC and common names, key poperties, natural occurrence, societal uses, and an interesting fact.



2) BuckyBert (computer game): The game, in which players hop around the surface of C_{60} and other nanocarbons, colouring hexagons and pentagons and eliminating opponents, is getting very good. Significant coding was done during this week, with detailed improvement steps now agreed. SS and JG are meeting to follow up on invoices with their developer contact.

3) Life from Stars / Life on Earth board game: The game has evolved considerably and is now close to a playable prototype. IS has taken the ideas developed during the week and will write them up over the following week. The plan is to have one working copy ready for Tenerife (Final Joint Scientific Meeting), with further zoom meetings in between. IS is coordinating from the game side.

4) Google Earth Fullerene Map: IR is following up with the Fuller Institute with the aim of sending plaques to geodesic dome structures in public places, with a QR code linking to C_{60} information.

5) Molecule cards for Cheminoes: The group discussed developing a set of molecule cards to accompany the Cheminoes game (see the attached Ethene card above as an example). This could be supported via a virtual mobility grant.

Other Discussions

i) Articles: Two potential articles were discussed; SS to lead one on "serious games"; EC and CE are in conversation with a journalist about a possible piece for Nature Chemistry on science and games. Notes on structure and ideas have been taken, and photos captured throughout the week.

ii) Translations: The group would like to make products (especially BuckyBert) available in multiple languages. Since all text sits in a single file, this should be achievable; a Google Sheet with AI-assisted translation checked by NanoSpace volunteers was proposed.

iii) Life after NanoSpace: The group discussed the future of WG4 beyond the project. One option under consideration is forming a UK charitable company to group activities together. COST would need to be consulted; IP protection and registered designs for outreach products were also raised.

iv) Virtual mobility grant: CE will explore whether a single grant could cover the various support needs: scientific input for the board game, possible elements of BuckyBert, and development of molecule cards for Cheminoes. Jon Hare is one potential candidate; Alessandra may also suggest someone.

vi) Tenerife (Final Joint Scientific Meeting): The group plans a WG4 session similar to the one at Kaunas; i.e., an intro from SS, short presentations on each project, and a hands-on testing session over a long coffee break, closing with remarks from CE and EC. Logistics of getting Cheminoes sets to Tenerife need to be worked out.
