The 1st International Online Conference on Gels (IOCG 2025 Conference)

Part of the International Online Conference on Gels series

3–5 December 2025

Event's Timezone: Central European Time

https://sciforum.net/event/IOCG2025?subscribe&section=#welcome

Event

The 1st International Online Conference on Gels

Select a session

The Supramolecular Structure and Properties of Gels;

Hydrogels, Organogels, Xerogels, and Aerogels; ○

Gels in Agriculture and Food;

Gels in Medicine, Regenerative Medicine, Pharmacy, and Personal Care Products;

Gels in Electro-magneto-mechanical Devices, 3D Printing, and Manufacturing;

Gels in Chemical Processing, Energy, and Environment.

Please indicate your publication preferences

I do not want my abstract to be published in any MDPI Proceedings Journals. ○

I want my abstract to be published in the conference report in an MDPI Proceedings Journal that aligns with the conference subject, and I am therefore willing to be contacted by the editorial office on this regard.

I would like to extend my abstract by submitting a full conference paper (approximately 4-8 pages) to an MDPI Proceedings Journal that aligns with the conference subject, and I am therefore willing to be contacted by the editorial office on this regard.

I would like to contribute a full manuscript to the organizing journal's conference special issue, and I am therefore willing to be contacted by the editorial office on this regard.

Submission instructions

The abstract structure should include the introduction, methods, results, and conclusions sections of about 200–300 words in length.

Consider me for oral contribution

Yes ○

No

Consider me for poster contribution

Yes ○

No

Note: The final type of your contribution will be subject to the event chair's/session chair's decision after submission acceptance.

Title: A High-Adhesion Polymer Gel for Polytetrafluoroethylene

Abstract, word count limits (min: 200, max: 300) (please note that submission authors are defined separately in next step):

Polytetrafluoroethylene (PTFE) is valued for its low dielectric constant and loss tangent but has low surface free energy (SFE), hindering adhesion to other materials. Our group developed a copolymer gel, poly(2-(diethylamino)ethyl methacrylate-co-dodecyl acrylate) (P(DEAE-co-DA)), with exceptional adhesion to PTFE. Gel sheets were synthesized via photo-radical bulk polymerization, alongside homopolymer gels poly(2-(diethylamino)ethyl methacrylate) (PDEAE) and poly(dodecyl acrylate) (PDA) for comparison. These were assessed using 90° peel tests, contact angle measurements, and oscillatory frequency sweep tests. The 90° peel tests revealed that P(DEAE-co-DA) exhibited 4–6 times higher peel strength than PDEAE and PDA. SFE was highest for PDEAE, followed by P(DEAE-co-DA), PTFE, and PDA. Theoretical adhesive work (Wa) to PTFE was 48.41 mJ/m² for PDEAE, 44.99 mJ/m² for P(DEAE-co-DA), and 36.51 mJ/m² for PDA, suggesting PDEAE's superior adhesion. However, experimental peel tests showed P(DEAE-co-DA) had the highest peel strength. To explore this discrepancy, oscillatory frequency sweep tests measured storage modulus, loss modulus, Tanδ, relaxation time (τ), and activation energy (Ea). P(DEAE-co-DA) displayed higher Tanδ, shorter τ, and a significantly lower Ea (8.03 kJ/mol) compared to PDEAE (108 kJ/mol) and PDA (15.9 kJ/mol). This low Ea enhances chain mobility, enabling side chains to align with the PTFE surface, strengthening van der Waals interactions. The superior peel strength of P(DEAE-co-DA) primarily stems from enhanced viscoelastic energy dissipation, explaining its outstanding adhesion despite a lower theoretical Wa.

(242/200~300))

Keywords (use semicolon to separate multiple keywords): adhesion; polytetrafluoroethylene (PTFE); polymer gel

Open access

I acknowledge that I have read and agree with the Sciforum terms of use, MDPI privacy and open access policies, and confirm that my submission can be displayed publicly on the website.

Authors: Toshiya Yamasaki, Jin Gong

Affiliation:

Graduate School of Organic Materials Science, Yamagata University