

# Bulletin Board

## Contents

JUL. 04, 2025

(click on page numbers for links)

### CHEMICAL EFFECTS

- Investigation of the Effect of Exposure to Liquid Chemicals on the Strength Performance of 3D-Printed Parts from Different Filament Types..3
- Machine Learning and Large Language Models for Modeling Complex Toxicity Pathways and Predicting Steroidogenesis.....4
- Sustainable Closed-loop Recycling of Polyester Waste using Reconstructed Defective-Metal-Organic Frameworks .....4

### ENVIRONMENTAL RESEARCH

- Assessment of vape shop built environment: airborne nicotine, particulate matter, ventilation, hazard identification, workplace practices, and safety perceptions.....5
- Estimates, temporal evolution, and drivers of the global burden of cardiovascular disease attributable to particulate matter air pollution, 1990-2021: A systematic analysis from the global burden of disease study 2021 .....6
- Exploring the combined toxic effects of tri-n-butyl phosphate and polystyrene micro/nano-plastics on *Daphnia magna* under environmentally relevant concentrations .....7

### PHARMACEUTICAL/TOXICOLOGY

- Cancer Care Affordability and the Healthcare Team: Expanding an Assessment of Clinical Perceptions and Attitudes in Nursing .....8
- A bedside-to-bench translational analysis of NF1 alterations and CDK4/6 inhibitor resistance in hormone receptor-positive metastatic breast cancer.....8

### OCCUPATIONAL

- Artisanal Gold Mining in Mongolia: Silica Exposure and Silicosis Risk Factors-Field Survey .....10
- Factors associated with the clinical use of the International Classification of Functioning, Disability and Health by physical and occupational therapists: a national exploratory survey .....11

## CONTACT US

subscribers@chemwatch.net  
tel +61 3 9572 4700  
fax +61 3 9572 4777

1227 Glen Huntly Rd  
Glen Huntly  
Victoria 3163 Australia

# Bulletin Board

## Technical

JUL. 04, 2025

### CHEMICAL EFFECTS

#### Investigation of the Effect of Exposure to Liquid Chemicals on the Strength Performance of 3D-Printed Parts from Different Filament Types

2025-06-12

Additive manufacturing (AM), particularly fused deposition modeling (FDM) 3D printing, has emerged as a versatile and accessible technology for prototyping and functional part production across a wide range of industrial applications. One of the critical performance-limiting factors in AM is the chemical resistance of thermoplastic materials, which directly influences their structural integrity, durability, and suitability in chemically aggressive environments. This study systematically investigates the chemical resistance of eight different widely utilized FDM filaments- acrylonitrile butadiene styrene (ABS), acrylonitrile styrene acrylate (ASA), polyamide (PA, Nylon), polycarbonate (PC), polyethylene terephthalate glycol (PETG), polylactic acid (PLA), polypropylene (PP), and polyvinyl butyral (PVB)-by examining their tensile strength and impact resistance after immersion in representative chemical agents: distilled water, ethanol (99.5%), isopropyl alcohol (75% and 99%), acetic acid (8%), hydrochloric acid (37%), hydrogen peroxide (30%), and acetone (99.5%). Quantitative mechanical testing was conducted in accordance with ASTM D638 and ASTM D256 standards, and statistical variability was accounted for using triplicate measurements with standard deviation analysis. The results reveal that PP exhibits the highest chemical resilience, retaining over 97% of its mechanical properties even after 7 days of immersion in aggressive solvents like acetone. PETG and ASA also demonstrated quite successful stability (>90% retention) in mildly corrosive environments such as alcohols and weak acids. In contrast, PLA, due to its low crystallinity and polar ester backbone, and PVB, due to its high amorphous content, showed substantial degradation: tensile strength losses exceeding 70% and impact resistance dropping below 20% in acetone. Moderate resistance was observed in ABS and PC, which maintained structural properties in neutral or weakly reactive conditions but suffered mechanical deterioration (>50% loss) in solvent-rich media. A strong correlation ( $r > 0.95$ ) between tensile and impact strength reduction was found for most materials, indicating that chemical attack affects both static and dynamic mechanical performance uniformly. The findings of this study provide a robust framework for selecting appropriate 3D printing materials in applications exposed to solvents, acids, or oxidizing agents.

# Bulletin Board

## Technical

JUL. 04, 2025

PP is recommended for harsh chemical environments; PETG and ASA are suitable for moderate exposure scenarios, whereas PLA and PVB should be limited to low-risk, esthetic, or disposable applications.

Authors: Arslan Kaptan

Full Source: Polymers 2025 Jun 12;17(12):1637. doi: 10.3390/polym17121637.

#### Machine Learning and Large Language Models for Modeling Complex Toxicity Pathways and Predicting Steroidogenesis

2025-06-27

High-throughput screening and computational models have been effective in predicting chemical interactions with estrogen and androgen receptors, but similar approaches for steroidogenesis remain limited. To address this gap, we developed general steroidogenesis modulation models using data from 1,800 chemicals screened in H295R human adrenocortical carcinoma cells. A random forest model was validated using a prospective test set of 20 compounds (14 predicted active, 6 inactive), achieving 80% accuracy with conformal prediction adjustments. In parallel, we built classification and regression models based on IC50 data from ChEMBL for key steroidogenic enzymes, including CYP17A1, CYP21A2, CYP11B1, CYP11B2, 17 $\beta$ -HSD (1/2/3/5), 5 $\alpha$ -reductase (1/2), and CYP19A1 (126-9,327 compounds per target). These models enable predictions of both general steroidogenesis inhibition and potential molecular targets. Additionally, we developed a transformer-based model (MolBART) to predict all end points simultaneously and validated this performance. Combined, these models may offer a rapid and scalable system for assessing chemical impacts on steroidogenesis, supporting chemical risk assessment, product stewardship, and regulatory decision-making.

Authors: Thomas R Lane, Patricia A Vignaux, Joshua S Harris, Scott H Snyder, Fabio Urbina, Sean Ekins

Full Source: Environmental science &amp; technology 2025 Jun 27. doi: 10.1021/acs.est.5c04054.

#### Sustainable Closed-loop Recycling of Polyester Waste using Reconstructed Defective-Metal-Organic Frameworks

2025-06-27

Chemical recycling of polyester waste presents a promising strategy for achieving a sustainable circular economy. However, the development of



# Bulletin Board

## Technical

JUL. 04, 2025

efficient, low-cost recycling methods that minimize energy consumption and carbon emissions remains challenging. Here, we report an approach for depolymerization polyester waste to bis(hydroxyethyl)terephthalate (BHET) using a reconstructed metal-organic framework (r-Zn-MOF74-NT) catalyst under mild conditions. The r-Zn-MOF74-NT exhibited a space-time yield of 1035.8 gBHET gcat-1 h-1 at 190 °C. Importantly, this is an order of magnitude higher than that reported for similar MOF-based catalysts. In situ spectroscopy combined with theoretical calculations revealed that the depolymerization pathway involves the activation of oxygen and ethylene glycol adsorbed on r-Zn-MOF74-NT, forming nucleophilic intermediates. These intermediates then facilitate the cleavage of polyester C-O bond through nucleophilic attack, thereby gradually generating the BHET product. Sustainability evaluation results validated the circular economy feasibility of the recycling approach, with a minimum sales price (MSP) of 498 \$/ton, much lower than the MSP of the traditional petroleum-based production route (1,000 \$/ton). The approach also achieved a 61% reduction in energy use and a 52% decrease in greenhouse gas emissions. This work provides a sustainable solution for managing polyester waste accumulation.

Authors: Jingjing Cao, Wei Chen, Wei Jiang, Xiaodong Li, Ping Sun, Shaohai Fu, Quanxing Zhang

Full Source: Angewandte Chemie (International ed. in English) 2025 Jun 27:e202504743. doi: 10.1002/anie.202504743.

## ENVIRONMENTAL RESEARCH

### Assessment of vape shop built environment: airborne nicotine, particulate matter, ventilation, hazard identification, workplace practices, and safety perceptions

2025-06-19

Vape shops are established to sell electronic cigarette (EC) devices, e-liquids or e-juices, and other related accessories. EC use is prominent in vape shops and indoor EC use has been associated with elevated levels of nicotine and particulate matter (PM). This study assessed health and safety conditions, practices, building characteristics, nicotine, and PM concentrations in vape shops during business hours. Sixty-four vape shops were visited but only 15 vape shops consented to participate in this study. The majority of the vape shops had general ventilation (100%) and lounge areas (60%). No workers were observed not to use any personal protective equipment (PPE) such as gloves, aprons, face masks, etc. The mean and

# Bulletin Board

## Technical

JUL. 04, 2025

standard deviation of the shop volume, air flowrate, and air exchange rate were  $12.361 \pm 12.990$  ft<sup>3</sup>,  $1.203 \pm 1.584$  ft<sup>3</sup>/min, and  $5.8 \pm 2.8$  h<sup>-1</sup>, respectively. The mean and standard deviation of the time-averaged concentration of nicotine, PM<sub>2.5</sub>, respirable PM, and total PM were  $3.92 \pm 3.73$ ,  $32.01 \pm 25.85$ ,  $36.03 \pm 30.91$ , and  $43.67 \pm 34.78$  ug/m<sup>3</sup>, respectively. The nicotine, PM<sub>2.5</sub>, respirable PM, and total PM levels were significantly below their respective occupational or ambient guideline limits ( $P < 0.05$ ). The vape shop environments in this study did not appear to pose a significant risk of second-hand exposure to elevated levels of airborne nicotine and PM during business hours.

Authors: Toluwanimi M Oni, Balaji Sadhasivam, Evan L Floyd

Full Source: Annals of work exposures and health 2025 Jun 19:wxaf018. doi: 10.1093/annweh/wxaf018.

### Estimates, temporal evolution, and drivers of the global burden of cardiovascular disease attributable to particulate matter air pollution, 1990-2021: A systematic analysis from the global burden of disease study 2021

2025-06-26

Cardiovascular diseases (CVDs) are the most common non-communicable diseases worldwide. Fine particulate matter (PM<sub>2.5</sub>) has emerged as a significant modifiable risk factor contributing to the burden of CVDs. This study examines the global burden of CVDs attributable to PM<sub>2.5</sub> pollution from 1990 to 2021. Using data from the Global Burden of Disease (GBD) study. We calculated the estimated annual percentage change (EAPC) via log-linear regression and assessed age-standardized rates (ASRs, per 100,000 population) for deaths and disability-adjusted life years (DALYs). While global ASRs for PM<sub>2.5</sub>-related DALYs declined from 2009.92 to 1161.77 per 100,000, these reductions were unequal: high-income regions, such as North America and Western Europe, achieved substantial progress, whereas low-income regions, particularly Sub-Saharan Africa and South Asia, faced rising burdens from PM<sub>2.5</sub> exposure. The study highlights the shift from household to ambient sources of PM<sub>2.5</sub> as the main contributor to CVDs, particularly in rapidly industrializing regions, with the total DALYs attributable to PM<sub>2.5</sub> increasing from 78.87 million in 1990-99.64 million in 2021. Decomposition analysis identifies population growth, aging, and epidemiological changes as key drivers of the global trends. This study



# Bulletin Board

## Technical

JUL. 04, 2025

provides evidence-based guidance for the CVDs prevention and PM2.5 air pollution policy.

Authors: Shuailing Liu, Huajie Yang, Mingzheng Li, Yinchu Guo, Zhaoqi Zhang, Wei Liu, Shuo Wu, Tong Liu, Shenghang Li, Juexin Zhang, Yuejia Wang, Luoxin Li, Peng Shi

Full Source: Ecotoxicology and environmental safety 2025 Jun 26;302:118584. doi: 10.1016/j.ecoenv.2025.118584.

### Exploring the combined toxic effects of tri-n-butyl phosphate and polystyrene micro/nano-plastics on *Daphnia magna* under environmentally relevant concentrations

2025-06-27

As emerging pollutants prevalent in environments and biota, tri-n-butyl phosphate (TnBP) and microplastics (MPs) are harmful to aquatic organisms. Nevertheless, the combined toxicity of TnBP and MPs to aquatic organisms at environmental concentrations is still unknown. In this study, the co-toxic effects of both TnBP and micro/nano-polystyrene (MNPS) in *Daphnia magna* (*D. magna*) at environmental relevant concentrations were investigated for the first time. The results suggested that after 21 days of exposure to TnBP (1 µg/L) and MNPS (1 mg/L) alone or in combination, the expression of genes associated with growth and reproduction significantly decreased compared to the control group ( $p < 0.05$ ), suggesting that MNPS and TnBP exerted growth and reproductive toxicity to *D. magna*. Moreover, the co-exposure group had lower gene expression levels compared to the single exposure group, implying that combined exposure could exacerbate toxicity impacts on *D. magna*'s development and reproduction. The activities of enzymes related to oxidative stress and MDA levels in co-exposed group were higher than those in TnBP group, indicating that the MNPS enhanced TnBP-induced oxidative damage to *D. magna*. In addition, NPS might have caused greater oxidative stress and damage to *D. magna* than MPS, as higher enzyme activities and MDA levels were observed in the NPS groups. This study provided important information for a comprehensive understanding of the combined aquatic toxicity of MNPS and TnBP at environmental concentrations.

Authors: Lixiang Zhong, Xiaoli Chen, Menghuan Zhang, Mingfu Lin, Jun Wang, Yumei Huang

Full Source: Environmental geochemistry and health 2025 Jun 27;47(8):289. doi: 10.1007/s10653-025-02605-7.

# Bulletin Board

## Technical

JUL. 04, 2025

### PHARMACEUTICAL/TOXICOLOGY

#### Cancer Care Affordability and the Healthcare Team: Expanding an Assessment of Clinical Perceptions and Attitudes in Nursing

2025-06-12

Objectives: To investigate nursing staff perceptions of financial toxicity (FT), its causes, and their role in mitigating it, as well as their prior training in addressing financial concerns.

Sample & setting: 535 RNs, advanced practice providers, and ancillary staff at an urban comprehensive cancer center.

Methods & variables: Respondents completed an online survey, adapted from prior work with physicians, as part of a quality improvement effort.

Results: Most respondents (76%) felt (a) they should play an active role in interventions to minimize FT and (b) they should be aware of a patient's risk of FT. A greater proportion of advanced practice providers felt they should play an active role in interventions compared to RNs (chi-square = 4.1,  $p = 0.04$ ). Most respondents reported receiving no training on costs of care (87%) or how to have cost conversations (91%). Recommendations for mitigation included offering telehealth visits and changing follow-up intervals.

Implications for nursing: Nursing staff, including RNs and advanced practice providers, want to play an active role in preventing and mitigating FT but often feel they do not have the training to do so. Future efforts should focus on FT education for nursing staff.

Authors: Amy Caramore, Bayley Sharma, Justin O'Leary, Emeline M Aviki, Bridgette Thom

Full Source: Oncology nursing forum 2025 Jun 12;52(4):259-264. doi: 10.1188/25.ONF.259-264.

#### A bedside-to-bench translational analysis of NF1 alterations and CDK4/6 inhibitor resistance in hormone receptor-positive metastatic breast cancer

2025-06-26

Background: CDK4/6 inhibitors (CDK4/6i) are used for management of hormone receptor-positive (HR+) metastatic breast cancer (MBC), and activation of the RAS/MAPK and PI3K/AKT signalling pathways has been implicated in resistance to these agents. Pathogenic NF1 mutations (pNF1m) dysregulate RAS signalling, but NF1 has not been linked to



# Bulletin Board

## Technical

JUL. 04, 2025

CDK4/6i resistance. We analysed multi-institutional data, real-world evidence, and preclinical models to characterise the impact of pNF1m on CDK4/6i sensitivity.

**Methods:** A retrospective cohort of patients with pNF1m tumours were identified from 4 institutions between 2/2015-5/2023 and evaluated for progression-free survival and intrinsic/acquired resistance on CDK4/6i. Real-world clinical-genomic data from GuardantINFORM between 6/2014 and 3/2023 was analysed for associations between pNF1m and time-to-next-treatment or overall survival following CDK4/6i, adjusted using propensity score weighting. We used CRISPR/Cas9 to delete NF1 in MCF7 and T47D breast cancer cells in vitro. NF1-knockout (NF1-KO) and -wild-type (WT) cells were analysed with respect to CDK4/6i sensitivity, MAPK and PI3K pathway activation, and sensitivity to MAPK and PI3K pathway inhibitors. In parallel, we assessed treatment response in a patient-derived organoid (PDO) harbouring NF1 loss, established from an HR+/HER2- breast tumor following progression on a CDK4/6i.

**Findings:** Among 1962 multicentre patients, we identified 38 with HR+/HER2- MBC, pNF1m, and exposure to CDK4/6i. NF1-associated intrinsic or acquired resistance to CDK4/6i was observed in a majority of tumours, and in those with baseline pNF1m on first-line CDK4/6i, a median progression-free survival of 6.2 months was much less than expected in routine practice. Real-world weighted analysis of 1161 patients comparing 28 pNF1m to 1133 NF1 non-altered tumours demonstrated shorter time-to-next-treatment on CDK4/6i regimens (4.2 vs. 12.4 months, hazard ratio 3.14, 95% confidence interval 2.01-4.93) and overall survival (15.8 vs. 45.2 months, hazard ratio 2.04, 95% confidence interval 1.09-3.82). NF1-deleted cells exhibited reduced sensitivity to CDK4/6i with or without oestrogen suppression, which was accompanied by induction of both MAPK and PI3K pathways, the latter of which was exacerbated by CDK4/6i. Blockade of RAS or AKT, but not MEK or ERK, reversed CDK4/6i resistance mediated by NF1 loss in cell lines and the PDO.

**Interpretation:** NF1 mutations are associated with shorter therapy duration on CDK4/6i in MBC. A causal link between NF1 loss and CDK4/6i resistance was supported by experiments in HR + breast cancer cells. NF1 deletion was accompanied by activation of ERK and AKT, and blockade of RAS or AKT combined with CDK4/6i was effective in NF1-deleted cells and an NF1-mutant PDO.

**Funding:** Breast Cancer Research Foundation DRC-20-001, National Cancer Institute R01CA273246, National Institute of Health P30 CA142543, Susan G. Komen Breast Cancer Foundation SAB1800010, Department of Defence

# Bulletin Board

## Technical

JUL. 04, 2025

BC 210406, Mary Kay Ash Foundation International Postdoctoral Scholars in Cancer Research Fellowship.

**Authors:** Maxwell R Lloyd, Rosario Chica-Parrado, Caroline M Weipert, Todd C Knepper, Emily L Podany, Fabiana Napolitano, Dan Ye, Chang-Ching Lin, Yasuaki Uemoto, Jiemin Liao, Claire Wegrzyn, Christine M Walko, Lianne Y Ryan, Jennifer C Keenan, Arielle J Medford, Shiyuan A Liu, Gerburg M Wulf, Katherine K Clifton, Cynthia X Ma, Hyo S Han, Nicole Zhang, Leif W Ellisen, Aditya Bardia, Carlos L Arteaga, Ariella B Hanker, Seth A Wander  
**Full Source:** EBioMedicine 2025 Jun 26;118:105828. doi: 10.1016/j.ebiom.2025.105828.

## OCCUPATIONAL

### Artisanal Gold Mining in Mongolia: Silica Exposure and Silicosis Risk Factors-Field Survey

2025-06

**Background:** Silicosis remains a critical occupational health challenge, particularly among artisanal and small-scale gold miners (ASGM). This study investigates the prevalence of silicosis and its associated risk factors, while assessing the levels of respirable dust and crystalline silica exposure in Mongolian artisanal miners.

**Methods:** A cross-sectional survey was conducted with 124 employees of the Tsagaan Tsakhir artisanal gold miners in Bayankhongor Province, Mongolia. Participants completed questionnaires and underwent medical exams, including spirometry and X-rays. Dust samples (n = 10) were collected during a working day, and the workplace was divided into underground exploration and outdoor grinding areas. Multivariate analysis evaluated risk factors for silicosis.

**Results:** Underground quarrying (dry) showed the highest exposures (dust geometric mean (GM): 8.107 mg/m<sup>3</sup>; silica GM: 2.156 mg/m<sup>3</sup>), followed by grinding (dust GM: 1.374 mg/m<sup>3</sup>; silica GM: 0.555 mg/m<sup>3</sup>). Wet quarrying and packaging tasks had significantly lower levels. A total of 124 male participants (mean age 35.9, mean work years 5.7) were included. Twenty four participants (19.4%) had silicosis, with 58% having profusion 2 or higher. Multivariate analysis showed increased odds of silicosis with longer work years (OR = 2.6) and specific work positions (e.g., underground drilling: OR = 6.23).

**Conclusion:** Artisanal gold miners in Mongolia face significant health risks due to high silica exposure and inadequate protective measures. Urgent interventions, including improved dust control and routine medical



# Bulletin Board

## Technical

JUL. 04, 2025

surveillance, are needed to mitigate silicosis risks in this vulnerable population.

Authors: Densenbal Dansran, Ichinnorov Dashtseren, Garamjav Khishigdavaa, Solongo Bandi, Byambadolgor Dagviikhorol, Naransukh Damiran, Bayanmunkh Tseden, Bat-Erdene Moyor, Jun-Pyo Myong  
Full Source: Safety and health at work 2025 Jun;16(2):187-192. doi: 10.1016/j.shaw.2025.04.005.

### Factors associated with the clinical use of the International Classification of Functioning, Disability and Health by physical and occupational therapists: a national exploratory survey

2025-06-27

Objective: To identify the contextual factors associated with the clinical use of the International Classification of Functioning, Disability and Health (ICF).

Methods: A cross-sectional national exploratory survey was carried out in Brazil. The questionnaire Personal and environmental barriers for the implementation of the ICF by physical therapists was mailed to physical and occupational therapists. Logistic regression analysis was used to explore associations between contextual factors with education, attitudes, beliefs, interest, and perception related to work resources.

Results: The overall response rate was 70% (n = 604). Most respondents showed interest to incorporate ICF in the clinical practice (98%), believe that ICF is essential to clinical practice (93%), and facilitate communication (91%). The most cited barrier was difficulty in applying the ICF for assessments of patients. Four characteristics (access to ICF outside the work environment, supportive actions, sex and academic education) explained 11% of the variance associated with attitudes, beliefs and interests for the use of the ICF. Two characteristics (age and access to ICF at work) explained 7% of the variance associated with education for the use of ICF. Two characteristics (working in education institutions and working in urban regions) explained 10% of the variance associated with the perception of support and availability of resources for the ICF use.  
Conclusions: Physical and occupational therapists have positive attitudes toward the use of ICF, but most respondents did not receive satisfactory

# Bulletin Board

## Technical

JUL. 04, 2025

academic training and reported low self-efficacy for using ICF in clinical practice.

Authors: Fernanda M V Dias, Augusto Boening, Raíssa Pavesi, Janaine C Polese, Amanda A O Leopoldino, Anderson Coelho, Lucas R Nascimento  
Full Source: Physiotherapy theory and practice 2025 Jun 27:1-9. doi: 10.1080/09593985.2025.2516171.