

12

RESPONSIBLE CONSUMPTION AND PRODUCTION



2020-2024
Publications

116



2020-2024
Percentage of all
Taiwan Publications

2.8%



Course Units

531



Student Engagement
with Units on SDG 12

11,20

Research

New Materials for Sustainable Fashion

A research team led by Distinguished Professor Jiun-Tai Chen from the Department of Applied Chemistry has developed a self-repairing ion gel that rapidly repairs damage and restores its structure and function under specific pressing conditions. The technology, titled “Repairable substrate, preparation method thereof and repair method,” was granted a Taiwan invention patent in January 2025 and shows strong commercialization potential for smart apparel, medical dressings, and wearables. By extending product lifetimes, the material lowers replacement frequency and raw material use, reduces maintenance costs and carbon emissions, and advances circular design and life-cycle management while strengthening industry-academia linkages in high-value materials.

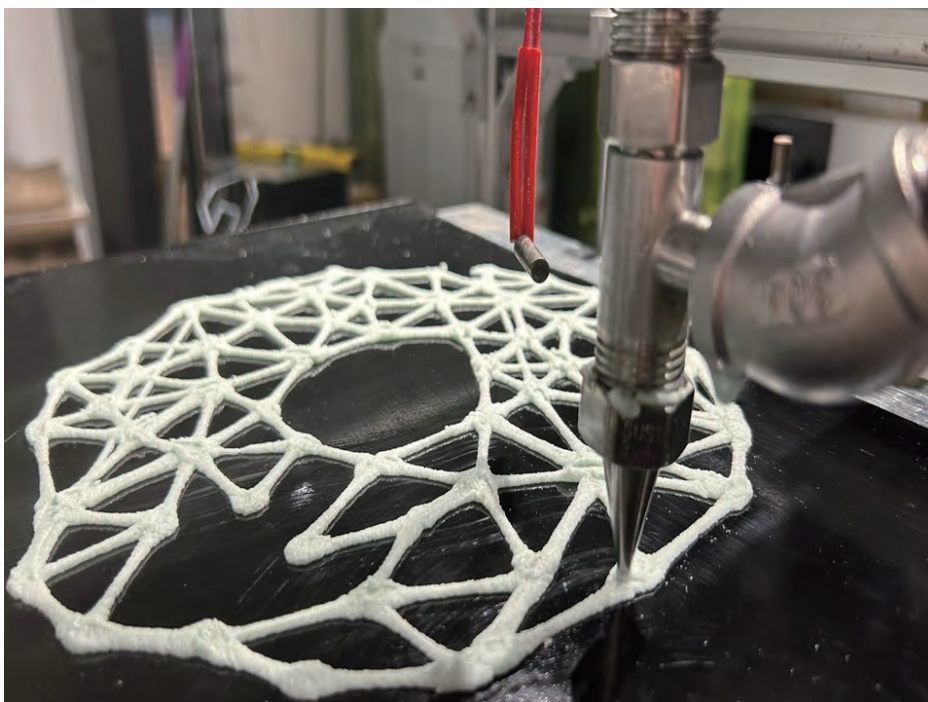
Upcycling Medical Waste into Wearable Health Tech

Addressing post-pandemic medical waste such as disposable masks, Assistant Professor Min-Hsuan Lee from the Institute of Environmental Engineering and his team proposed a “two birds with one stone” strategy. They recovered polypropylene (PP) from used masks and paired it with multi-walled carbon nanotube (MWCNT) conductive ink using a dip-coating process to fabricate flexible, wearable ECG electrodes. The electrodes deliver high conductivity, excellent stretch and bend tolerance, and stable signal output, and they can be integrated directly with commercial ECG devices for high-quality monitoring. This approach reduces the environmental burden of incineration and landfilling, and opens new pathways for e-textiles and digital health materials. The results were published in the journal, Sustainable Materials and Technologies.

Social Impact

Turning Discarded Fish Scales into Crafted Artworks

Confronting Taiwan's approximately 190,000 tons of annual seafood waste, as well as the challenge of small, malodorous, hard-to-recycle fish scales, Assistant Professor Jian-You Li of the Institute of Applied Arts launched a project called ReuScale (循鱗). The project purifies recovered scales through low-cost processes and, via 3D printing, transforms them into aesthetically refined, functional pieces, creating second-life value while easing disposal burdens. With roughly 90% of fish scales still landfilled, the project demonstrates a reduce–reuse–redesign circular pathway, builds local collection channels with communities, fishing ports, and processors, and pilots place-based collaboration models. Recognized by the Taiwan Sustainability Action Award and the Asia-Pacific Sustainability Action Award, ReuScale has begun material exchange work with Japanese research partners, and has been integrated into campus digital-fabrication courses and workshops to deepen awareness of waste issues and responsible consumption.





DIYGreen: A Zero-Waste, Circular Urban Farm System

Professor Jehng-Jung Kao and his team advance responsible consumption and production through the DIYGreen urban-farming system. Using recycled PET bottles as water reservoirs with capillary micro-irrigation, the system reduces water use and upkeep (small bottles supply water for 7–14 days, and large bottles supply water for over a month), and improves building thermal comfort (approximately 2–4 °C cooling). After 21 design iterations and over a decade of stable operation, the team plans to conduct a negative carbon accounting audit in 2025. On the circular end, chickens, earthworms, and black soldier flies upcycle kitchen scraps into organic fertilizer, closing the loop from resource to product to regeneration. Modular by design, DIYGreen has scaled to over 200 schools and enterprises across Taiwan, and is now paired with semi-transparent PV and service-learning deployments to broaden its cross-disciplinary impact.

Building Circular Water Resilience

NYCU's Environmental Technology and Smart Systems Research Center (ETSS), in partnership with the Water Resources Agency, is advancing a “desalination brine valorization” program. The team has built a continuously operated brine-to-resource module that uses a suite of advanced processes to extract value-added elements and chemicals from desalinated brine. This approach turns a by-product into a sustainable resource, meets domestic market needs, reduces dependence on imports and transport emissions, and strengthens circular economy practices and local supply chain resilience.

Education & Cultivation

Earth Day Woodcraft: From Knowledge to Habit

For Earth Day, NYCU hosted “Exploring the Value of Reclaimed Wood, Practicing Sustainable Living”—a three-part program featuring a talk on wood vinegar, circular-economy case shares, and a reclaimed-wood hands-on class. The activity started with the wood recycling process and the application of recycled materials, explaining the impact of consumer choices on the carbon footprint of the environment. By creating small objects, participants were able to experience the re-valuation of recycled materials with their own hands, turning sustainability from knowledge into action habits, strengthening sustainability literacy in schools, and encouraging the extension of circular concepts to families and communities.

Cutting Plastics in Campus Dining

NYCU is advancing green dining and plastic reduction along four tracks: source reduction, reuse, education, and community engagement. Student cafeterias have eliminated disposable tableware and plastic bags, encouraging dine-in or bring-your-own containers with discounts to build lasting habits. A pilot reusable lunchbox program was implemented for meetings and training sessions, where vendors collected, washed, and redeployed boxes to boost resource efficiency. Talks on low-carbon dining and green food services promote zero-waste practices and local organic choices, and offices are encouraged to order from vendors offering reusable containers. In partnership with Hsinchu City’s “Green Cup” campaign, incentives increase the share of faculty, staff, and students who bring their food and drink containers.





Stewardship

Green Procurement & Green Office

Procurement prioritizes eco-labelled, reusable, low-pollution, and energy-saving products. Green office measures include saving electricity, paper, and water; double-sided printing and paperless meetings; video conferencing to reduce travel; reducing single-use items; stronger waste sorting and recycling; and preference for green venues and public transport. NYCU has achieved 100% compliance for three consecutive years in the government's "Green Procurement & Green Office" assessments, reflecting consistent results. Aligned with the Ministry of Environment's Net-Zero Green Living initiatives, green purchasing and green office practices are embedded in daily routines.

Waste Management & Resource Reuse

Our school promotes resource recycling based on the principles of on-campus recycling and cross-departmental sharing of resources. We have established a "Used Property Listing Area," where various units list information on equipment, desks and chairs, laboratory equipment, air conditioners, vehicles, and other items that are being replaced or scrapped for reuse within the school. This extends the lifecycle of items and reduces the need for new purchases. Materials that are still reusable are publicly available on government platforms to expand cross-departmental and social welfare group reuse. On the waste side, we implement source sorting and diversion management, separating general waste from recyclables. We monitor data through weighing and removal records, regularly reviewing resource utilization rates and reduction trends as a basis for procurement and site improvements.