

Research Bulletin

June 2025

THE GEOMETRIC SECRETS OF SELJUK TOMBS HAVE BEEN REVEALED

The architectural features of tombs from the Anatolian Seljuk period have been analyzed for the first time using comprehensive numerical data. The study, conducted with 60 sectional drawings from 67 tombs, revealed that each structure possesses a unique geometric design. A particularly strong inverse relationship was identified between the dome angle and its height. Through these analyses, the study aims to contribute to the preservation of historical structures and a deeper understanding of architectural heritage.

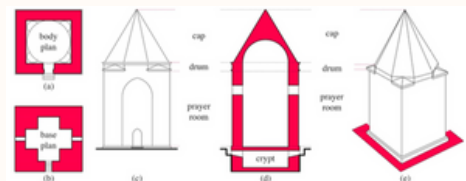


Fig. 1 Kumbet of Melik Gazi in Kayseri: a Base plan, b body plan, c elevation, d section and main components, e axonometric view and main components. Image: authors based on Özgüç and Akok 1954



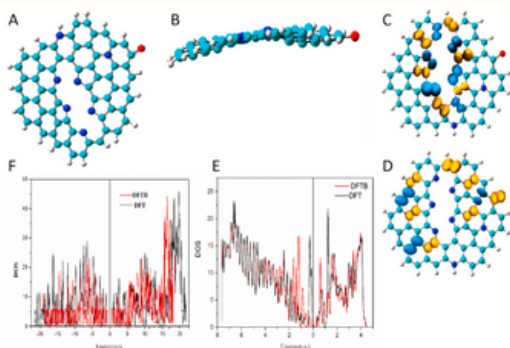
Fig. 2 Main body classes of kumbets. a Square, b polygonal, c circular. Image: authors



Güzelci, O. Z. and Türel, A. (2024). Analysis of Geometric Features in Anatolian Seljuk Kumbets. Nexus Network Journal, 27(2), 315-334. <https://doi.org/10.1007/s00004-024-00804-w>

DURABLE CARBON DOT LIGHT SOURCES DEVELOPED FOR BRIGHT GREEN AND BLUE LEDs

A new generation of carbon-based dots has been shown to emit solid-state green and blue light. Synthesized using a microwave-assisted method and enhanced with biuret additives, these carbon dots demonstrated outstanding optical properties. The green-emitting dots achieved a quantum yield of up to 78%, while the blue-emitting ones exhibited high color purity. Their optical characteristics were validated through both experimental and theoretical approaches. When integrated into light-emitting diodes (LEDs), these materials enabled the production of environmentally friendly, durable, and efficient devices.

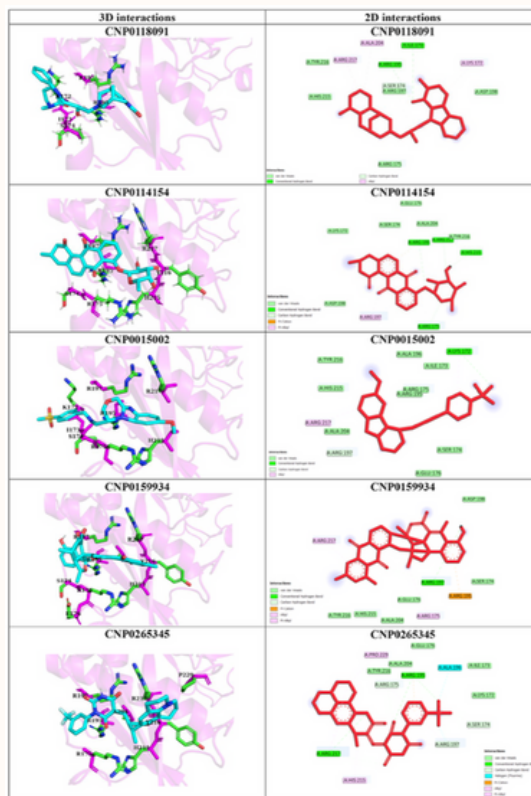


Havasi, N., Sahraei, R., Soheyli, E., Lan, Y., Lou, Q., Houshmand, F., Zheng G., Phul R., Mutlugun E., & Shan, C. (2025). Bright Green and Blue Solid-State Emitting Carbon Dots with Optimized Photoluminescence Characteristics for Fabrication of High-Performance Light Emitting Diodes. *Ceramics International*. <https://doi.org/10.1016/j.ceramint.2025.06.086>



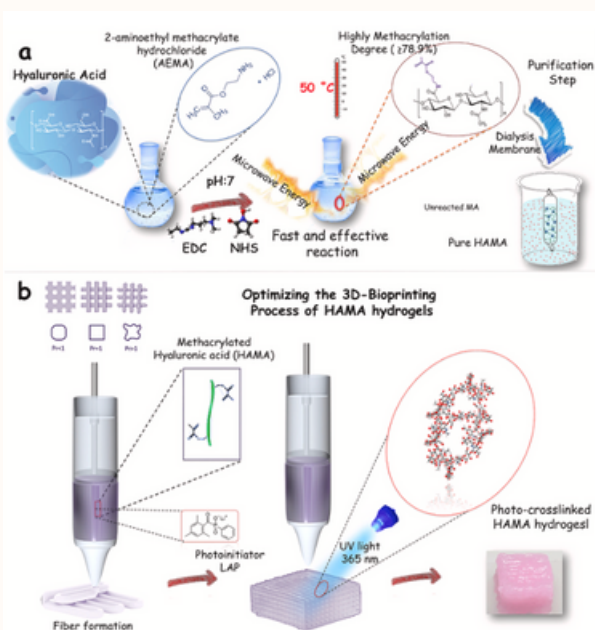
NEW DRUG CANDIDATES IDENTIFIED AGAINST IMMUNE SYSTEM DISEASES

New drug candidates targeting the enzyme *Spleen Tyrosine Kinase (Syk)*, which plays a critical role in the immune system, have been identified. Using virtual screening and molecular docking techniques, researchers pinpointed molecules capable of binding to the SH2 domains of *Syk*. These compounds demonstrated potential for the treatment of various immune-related diseases. Evaluations of their biological suitability also yielded promising results. In this respect, the study makes a significant contribution to the drug discovery process through digital methods. The findings support the development of innovative solutions in the field of healthcare.



Şansaçar, M., Sarı, C., Yücel, M. S., Gencer Akçok, E. B., & Akçok, İ. (2025). Discovery of New Candidates Targeting the SH2 Domains of Spleen Tyrosine Kinase (STK) Through in Silico Studies. *ChemistrySelect*, 10(22). <https://doi.org/10.1002/slct.202500547>

MICROWAVE ENERGY REVOLUTIONIZES BIOINK PRODUCTION



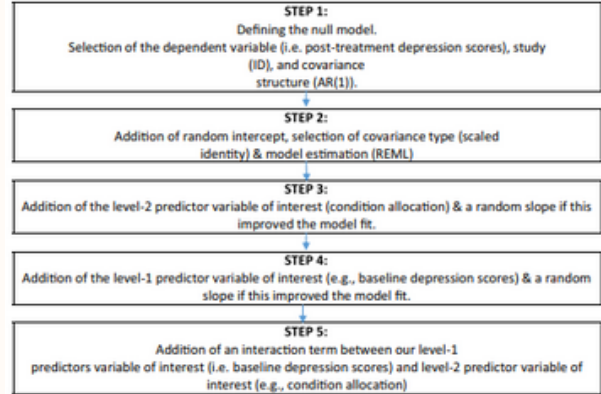
A critical role for microwave energy has been revealed in the development of light-curable methacrylated hyaluronic acid (HAMA) bioinks for 3D bioprinting. Microwave-assisted synthesis reduced reaction time from 24 hours to 6 minutes, increasing efficiency and shortening the purification period. HAMA hydrogels produced by this method exhibited improved mechanical durability, rheological properties, and swelling characteristics. The highest degree of methacrylation (78%) was achieved in hydrogels synthesized with 100W microwave energy. This advancement lays the groundwork for sustainable bioink production for 3D bioprinting in fields such as tissue engineering.

Ishtyah, Y. R. B., Coşgun, S., Ceylan, D., Demirtaş, T. T., & Dinçer, S. (2025). Enhancing Bioink Potential of Hyaluronic Acid by Microwave-induced Methacrylation. *Reactive and Functional Polymers*, 215, 106367. <https://doi.org/10.1016/j.reactfunctpolym.2025.106367>



IMPACT OF PSYCHOLOGICAL TREATMENTS ON BIPOLAR DEPRESSION INVESTIGATED

A meta-analysis examining the effectiveness of psychological interventions in reducing depression symptoms in individuals with Bipolar I and II disorders has been completed. The study evaluated individual patient data from 668 participants, determining that psychological treatments significantly lowered depression scores. Notably, Cognitive Behavioral Therapy (CBT) was observed to reduce depression scores relative to comparator conditions. The research is stated to have provided significant insights into the role of psychological interventions in treating bipolar depression.



Yilmaz, S., Huguet, A., Kisely, S., Rao, S., Wang, J., Price, M., Morriss, R., Inder, M., Perich, T., Wright, K. (2025). The Clinical Efficacy Of Psychological Interventions For Bipolar Depression: A Systematic Review And Individual Patient Data (Ipd) Meta-Analysis. *Psychological medicine*, 55, e154.

SPECTRE ATTACKS DETECTED WITH NEW DATASET

A study utilizing deep learning methods for hardware-level detection of Spectre attacks introduced a new dataset called "Spec17Tre". Real hardware data was collected using the Gem5 simulator. A hybrid model combining Long Short-Term Memory (LSTM) and Convolutional Neural Network (CNN) methods achieved 95% accuracy and an F1 score of 0.999. This method demonstrated the ability to detect attacks independently of the software level.

Fig. 1 Structure of the LSTM model

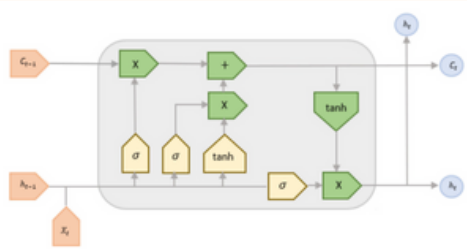


Fig. 2 Architecture of proposed method of study



Aktas-Aydin, H., & Yalcin, G. (2025). Spec17Tre: A New Dataset in Hardware Security and Using Deep Learning for Detecting Spectre Attacks. *Arabian Journal for Science and Engineering*, 1-12.



TRABZON TUNNEL WASTE DISPOSAL: SUSTAINABLE SOLUTIONS IDENTIFIED

A significant study was conducted regarding the disposal of waste from a major tunnel project in Trabzon. This research utilized a novel decision-making framework to evaluate both land-based and seaside disposal options. The primary focus was on minimizing greenhouse gas emissions resulting from waste transportation. The study concluded that, despite Trabzon's mountainous terrain, suitable landside areas exist as alternatives to sea filling. Considering both the lowest emissions and similar suitability rates, the seaside disposal option was deemed more sustainable for the Trabzon tunneling project.

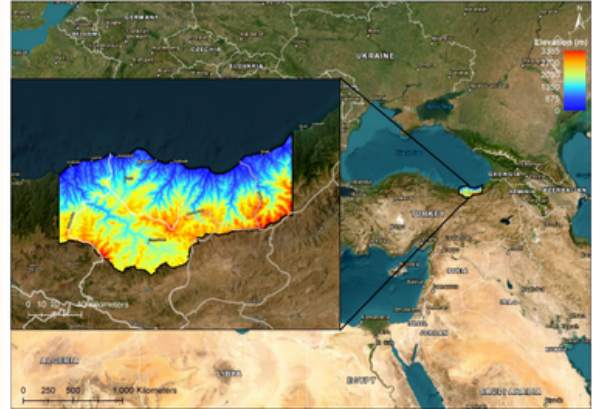
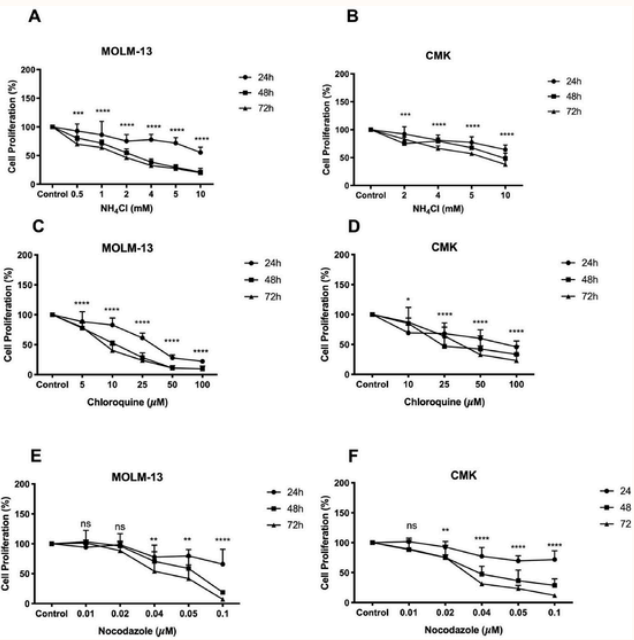


Fig. 1 Digital Elevation Map (DEM) of Trabzon province, Türkiye.



Dinçer, A. E., Demir, A., Öztürk, Ş., & Yılmaz, K. (2025). A Sustainable Decision-Making Framework To Evaluate Land And Seaside Disposal Options For Tunnel Spoil: A Case Study Of Trabzon. *Journal of Mountain Science*, 22(5), 1617-1632.



NEW HOPE FOR LEUKEMIA TREATMENT

A discovery in the treatment of acute myeloid leukemia (AML) has found that targeting two key pathways responsible for cancer cell survival simultaneously is effective. It was observed that inhibiting both the Hedgehog (Hh) signaling pathway and autophagy (a cellular recycling process) reduces the proliferation of leukemia cells. This dual inhibition provides more successful outcomes than single treatments, offering a promising new therapeutic option in the fight against AML.

Şansaçar, M., Pepe, N. A., Akçok, E. B. G., & El Khatib, M. (2025). Efficacy of Combinatorial Inhibition of Hedgehog and Autophagy Pathways on the Survival of AML Cell Lines. *Biochemical and Biophysical Research Communications*, 152034.



UNHAPPINESS CAUSED BY UNEMPLOYMENT EXPLAINED BY SOCIAL NORMS

A study in Turkey examined the impact of social norms and personal beliefs on the happiness of unemployed individuals. The research revealed that in areas where unemployment is prevalent, the negative effect of unemployment on happiness is slightly reduced. However, societal pressure to find a job was found to slightly increase unhappiness. These effects were observed to be more pronounced, particularly among the short-term unemployed. It was emphasized that individuals' perceived value of employment and the social pressure they feel are significant factors influencing their happiness.

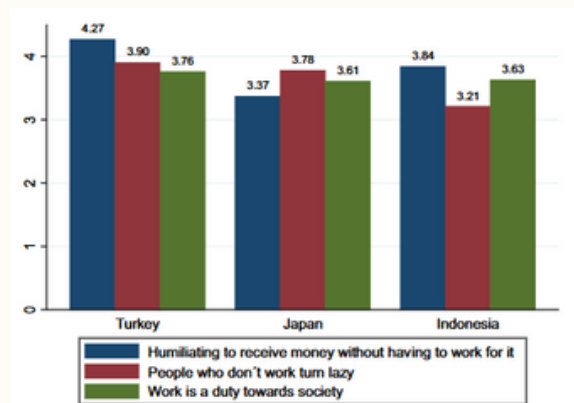


FIGURE 1 Measures of work norms in selected countries. Source: WVS (2020).

Uğur, Z. B., & Durak, A. (2025). Unhappiness Among The Unemployed: The Roles Of Descriptive Norms, Injunctive Norms And Personal Beliefs. *Asian Journal of Social Psychology*, 28(2), e70016.



ARTIFICIAL INTELLIGENCE SHOWS PROMISE IN MELANOMA DIAGNOSIS

A recent meta-analysis has revealed that artificial intelligence (AI) and machine learning methods, particularly when utilizing dermoscopic images, demonstrate promising results in the diagnosis of melanoma (a type of skin cancer). Hybrid AI models have been noted for their high capability in predicting diseases and their impressive diagnostic performance. These findings could assist clinicians in interpreting the most suitable algorithms for melanoma diagnosis and hold the potential to enhance early detection rates, thereby improving patient outcomes.

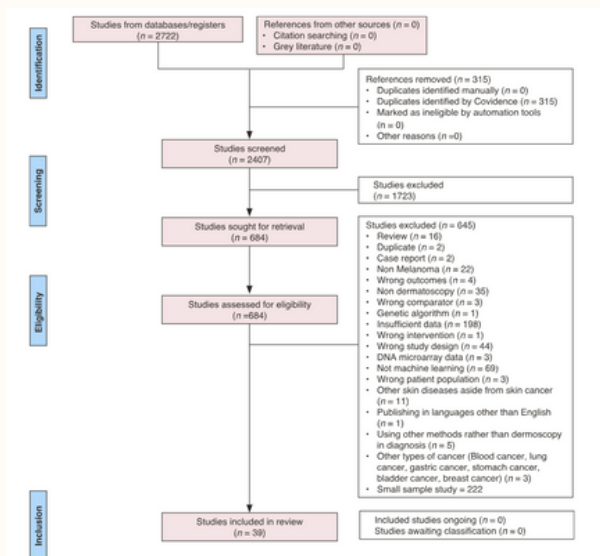


FIGURE 1 PRISMA flow diagram of the study selection process. PRISMA, Preferred Reporting Item for Systematic Reviews and Meta-Analyses.



Ertürk Zararsız, G., Yerlitaş Taştan, S. I., Çelik Gürbulak, E., Erakcaoğlu, A., Yılmaz Işıktan, S., Demirbaş, A., Ertaş R., Eroğlu İ., Korkmaz S., Elmas Ö.F., Zararsız, G. (2025). Diagnosis Melanoma With Artificial Intelligence Systems: A Meta-analysis Study And Systematic Review. *Journal of the European Academy of Dermatology and Venereology*.

ACADEMICS PROPOSE A 'PEDAGOGY OF DEATH' FOR THE CURRICULUM

A study examining how the phenomenon of death should be addressed in educational stages from preschool to high school has revealed a strong consensus among academics that this topic should be included in educational programs. It was stated that contemplating death provides an awareness of the meaning of life and contributes to students' personal development and emotional resilience. In line with these findings, the place of "death pedagogy" in education was emphasized.

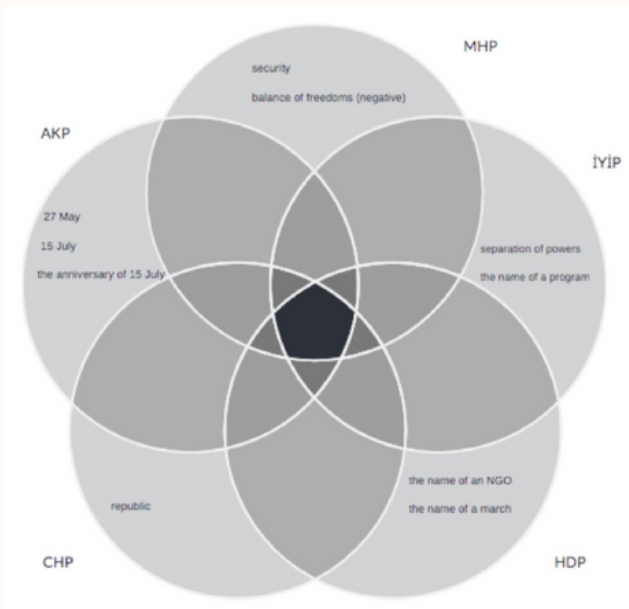
Themes	Sub-themes
Teaching death-related topics necessitates an appropriate pedagogical approach	<ul style="list-style-type: none"> physical, cognitive, and emotional developmental stages instructional methods scope of topics
Incorporating some aspect of death into each course acknowledges death as part of life	<ul style="list-style-type: none"> infusing existing courses subject areas compulsory religious education drawbacks of separate courses
Teachers should receive training and participate in the process under the guidance of school counselors	<ul style="list-style-type: none"> teacher training supporting teachers psychologically sharing responsibilities
Death pedagogy is essential because it contributes to developing a more meaningful life	<ul style="list-style-type: none"> stronger psychological resilience crisis intervention



Sonbul, Z. F. (2025). The Need for Death Pedagogy: Academics' Opinions on the Place of Death in the Curricula. *Death Studies*, 1-16. <https://doi.org/10.1080/07481187.2025.2509904>

DEEP DIVISIONS IDENTIFIED IN THE UNDERSTANDING OF DEMOCRACY IN TURKEY

In an analysis of Twitter posts regarding the understanding of democracy by political parties in Turkey, it was revealed that the meanings attributed to democracy largely differ among parties. Concepts such as representation, pluralism, freedoms, and participation were found to be interpreted in different ways. This situation was assessed to potentially increase political polarization. The research highlighted the importance of bringing democratic values together on common ground.



Akboğa, S., Şahin, O., & Arık, E. (2023). Polarisation Over the Meaning of Democracy: the Case of Political Parties in Turkey. *Politics*, 45(3), 333-354. <https://doi.org/10.1177/02633957231191445>

