The Athens Summer School on Organic Synthesis 2022 (ASSOS2022) and the 2nd International Young Investigator Symposium took place in Athens, Greece (Department of Chemistry, National and Kapodistrian University of Athens, Local Host: Assoc. Prof. Christoforos G. Kokotos) from Thursday July 7th, 2022 till Saturday 9th, 2022. ASSOS2022 was dedicated to new and sustainable methodologies and technologies, discussing cutting-edge both emerging and established hot areas of research in Organic Synthesis, such as Mechanochemistry, Photochemistry, Flow Chemistry, Microwave Chemistry and Advances in Synthetic Methodologies for Drug Discovery. Particular interest was given to green, environmentally friendly and sustainable methodologies that may find applications in Chemical Industry, including Pharmaceutical Industry and Fine Chemical Industry. Overall, there were more than 100 registered participants from 12 different countries. ASSOS2022 hosted 5 trainers from Italy, Estonia, Australia and Greece (2), while 10 young and talented researchers received a fellowship from the COST Action CA18112 Mechanochemistry for Sustainable Industry” to participate at ASSOS2022. Throughout the Summer School (7-9 July 2022), the experienced trainers, who are pioneers in their research areas, were hosted to provide lectures on introducing the above-mentioned topics, followed by presenting more focused examples from their own research experience. Also, young researchers and students presented their own research on the above-mentioned subjects. ASSOS2022 was a great forum for COST Action CA18112 Mechanochemistry for Sustainable Industry” to introduce Mechanochemistry to a broader audience and to promote new collaborations between Action members and non-members.