Lightweight cryptography has been a rising topic along with the global development of very constrained computing devices, for which conventional cryptographic algorithms are often too resource-consuming to fit the use-cases like RFID tags. Thus, it is of interest for us to study the efficiency and security of lightweight symmetric-key primitives. In this presentation, I will present new results and findings from several aspects, including cryptanalysis on recently proposed lightweight primitives, creating new lightweight components of block ciphers, and designing new state-of-the-art lightweight symmetric-key encryption algorithms.