Exciton-Polaritons in microcavities (MC) are unique bosonic half-light, half-matter quasiparticles that possess remarkable properties like strong non-linear interactions and a very low effective mass ($10^{-5}$-$10^{-4}$ me$_c$) which make possible to form polaritonic macroscopic coherent quantum phases at elevated kelvin temperatures. For these reasons, exciton-polaritons have attracted a strong interest in the scientific community and are very promising candidates for various applications in the next-generation optoelectronic devices, including polariton-based lasers, transistors and logic gates. The fabrication of polaritonic devices requires a reliable and practical way for guiding of exciton-polaritons in the MC. This challenge can be overcome by using thin metallic stripes deposited on the top of the MC. In this case, new quasiparticles called Tamm-Plasmon/Exciton-Polaritons (TPEP) form by the superposition of Tamm plasmons at the metal-semiconductor interface and the exciton-polaritons in the MC [1]. The purpose of this work is to explore the dynamical and tuneable modulation of TPEP modes by means of surface acoustic waves (SAWs).

In this contribution, we propose a MC structure for the realisation of TPEP states and a method for their dynamical and tuneable modulation using SAWs. SAWs are elastic modes that propagate at the surface of the semiconductor MC which can be generated using interdigital transducers (IDTs). Numerical calculations for the proposed MC structure show the formation of TPEP modes. The acoustic modulation of the TPEP modes by several meV is predicted. The modulation of the TPEP states originates in the modulation of the quantum well bandgap by SAWs. Furthermore, the dependence between the thickness of the metallic stripes, the TPEP line width, SAW power and the acoustic modulation of TPEP is studied.

The dynamical and tuneable modulation of the TPEP modes opens the way towards feasible signal modulation in polaritonic devices.