

PLASMOCOM project is aimed to develop a new concept for micro- and nano-scale dynamic and active photonic components based on metal/polymer structures. This approach will provide a route to novel integrated micro-optical devices and components combining photonics and electronics on the same chip. The target is to establish a new technological platform and create the technology for the integratable nanophotonic components with enhanced functionality for optical signal processing, on-electronic-chip optical interconnects and optical broadband applications. This is proposed to achieve on a single material system using polymer-based guides on a metal surface to confine and manipulate surface plasmon waves on a subwavelength scale. The passive, dynamic and active photonic devices will be fabricated and their performance characterized and tested. Electronically controlled nanophotonic devices (wavelength selective components, integrated power monitors and variable optical attenuators) will be demonstrated. The technology makes use of surface plasmon polaritons—electromagnetic excitations that propagate along and are bound to an interface between a metal and a dielectric. These surface electromagnetic waves enable the manipulation of optical signals on a sub-wavelength scale and, therefore, are uniquely suitable for applications in integrated photonics circuits and the development of electronically-driven and all-optical photonic devices. By utilizing the unique properties of metallic nanostructures that allow both optical and electrical signals to be transmitted along the same metallic circuitry, this approach provides a route to develop integrated components combining photonics and electronics on the same chip without a need of separate electronic and optical circuits. Advances in this field will pave the way to a novel class of scalable photonic components which are compatible with current photonic and electronic technologies and create a new class of hybrid photonic/electronic devices. Low fabrication cost, smaller size, enhanced dynamic and active functionality with lower electric consumption power and low intensity of control light make the proposed technology a competitive alternative to the existing nanophotonic approaches.

The PLASMOCOM consortium is co-ordinated by Professor A V Zayats (The Queen's University of Belfast, UK) and includes research groups led by Professor B N Chichkov (Lazer Zentrum Hannover eV, Germany), Professor S I Bozhevolnyi (Aalborg University, Denmark) and Professor A Dereux (University of Bourgogne, Dijon, France), Professor Romain Quidant (ICFO, Barcelona, Spain) as well as the planar optics specialist, SILIOS Technologies (France).