COSMIC – Publishable Summary Period: 1/2010-12/2010

The European project COSMIC targets to develop organic integrated circuits based on complementary thin film transistors and intend to pave the way to application of organic electronics. This should be finally demonstrated by different circuits, which are commonly envisioned applications for flexible circuits, like RF tags implemented in this project as Silent Tags, line driver circuits for fully flexible display applications or analogue-to-digital converters for foil sensor systems.

The project started in January 2010 with several measures to define the circuits and to specify devices needed for this. Technological p- and n-type organic TFTs have been developed based on commercial materials. The rather new availability of n-type semiconductor opens thereby opportunities for complementary logic that offers high process robustness and low power consumption for organic circuits, but also challenges process technology for a defined and stable fabrication process.

Development of fabrication has been started on transistor and simple device level with the target to get continuously stable and reliable device characteristics from which parameters can be extracted. These parameters together with models of the device will be the input to a design environment for medium to large scale integrated circuits.

COSMIC operates with three processing platforms for fabricating plastic films based on carrier, sheet and rolls. These should cover the different areas from low-cost to high-complex circuits and foster the synergy between the different technology approaches. In all three areas complementary devices and gates have been achieved, but still some development work has to be done to achieve the high requirements of a manufacturing process.

Another activity aims on the development of passive components, which are also very necessary for integration of circuits. From specification of the lead applications development concentrates on high ohmic resistors with low temperature coefficient (TCR) for voltage dividers and with high TCR for temperature sensing applications. For both promising materials have been selected and tested.

Work for the next period will concentrate on bringing the results for active and passive components into design and layout and to generate working circuits to sub-systems for the demonstraters with a robust complementary process.