The aim of this project is the exploration and realization of a new concept of hybrid pixel detectors for X-ray imaging, which has a high position resolution and allows to obtain spectrometric information about incoming photons (colour X-ray imaging). This detector will be able to operate with high intensity of incoming X-ray photons and register the X-ray photons from wide energy range.
Achieving project goals requires solving several principal problems in microelectronics and detector techniques. What is needed is:

- a novel architecture for low power, low noise charge amplifier and filter working in weak inversion region and with a limited power supply voltage, allowing fast signal processing,
- analysis and implementation in integrated circuit new fast algorithms with inter-pixel comunication on-line, to reduce the effect of charge sharing and to reconstruct X-ray photon energy,
- a methodology for noise and mismatch minimization in analog blocks of small silicon area in nanometer technology,
- new architectures for analog-digital signal processing, to obtain max. signal to noise ratio and fast signal processing,
- recducing the crosstalk between digital and analog blocks and crosstalk between pixels,
- fast readout of pixel matrix to allow maximum frame rate with a nearly zero dead time betwen frames.

To successfully realize ambitious tasks as given in the project several components are necessary: an experienced group in ASIC design, possibilities of ASIC fabrication in nanometer technologies, a laboratory for integrated circuit testing and international collaboration, which guarantees access to synchrotron beams.

The problems to be solved in the frame of this project are in the main scope of future fast digital X-ray imaging systems and in the design of low power mixed-mode integrated circuit in ultra deep submicron technologies. The authors of this project assume that their results will be not only presented on significant international conferences and in regular articles from JCR, but also they will also be in the lead in answer to principal questions for microelectronic design and in implementation in silicon integrated circuits. The results of this research in future will be the basis for further R&D works targeted at industrial applications.