

LOW NOISE MIX-MODE INTEGRATED CIRCUITS FOR MICRO-SENSOR READOUT

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Experimental techniques in physics, material science, biology and medicine want to gain profit from the advantages of the VLSI technology by using a new generation of electronic readout systems based on Application Specific Integrated Circuits (ASIC). These ASICs are able to process small amplitude signals from micro-sensor array and perform conversion to digital format. In this class of integrated circuits several important problems like power limitation, low level of noise, good matching performance and crosstalk effects must be solved simultaneously. This presentation shows two ASICs which, given the original solutions implemented and their universal properties, can be used in different applications and are significant milestones in experimental techniques. The first presented ASIC is the 64-channel charge amplifier with binary readout architecture for a low energy X-ray imaging techniques. This integrated circuit connected to silicon strip detector can be used in powder diffractometry and then it reduces the measurement time by two order of magnitude. The second presented ASIC is multichannel low noise readout for extracellular neural recording, which is able to cope with extracellular neuronal recording for the systems comprising several hundreds of electrodes. This ASIC can be used to monitor the neural activity of such complicated system like retina or brain, to find the answer to principal questions: how complicated neuronal system code and process information.

[1] P. Grybos, P. Maj, L. Ramello, K. Swientek :*Measurements of Matching and High Count Rate Performance of Multichannel ASIC for Digital X-ray Imaging Systems.*, IEEE Transactions on Nuclear Science, vol. **54**, no. 4, August 2007, pp. 1207-1215.

[2] A.M. Litke, N. Bezayiff, E.J. Chichilnisky, W. Cunningham, W. Dabrowski, A.A. Grillo, M. Grivich, P. Grybos, P. Hottowy, S. Kachiguine, R.S. Kalmar, K. Mathieson, D. Petrusca, M. Rahman, A. Sher: *What does the eye tell the brain?: Development of a system for the large-scale recording of retinal output activity.* IEEE Transactions on Nuclear Science, vol.**51**, no.4, Aug. 2004, pp.1434-40.