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On the sensitivity, selectivity, sensory information and optimal size of resistive chemical sensors

ABSTRACT. Information theoretical tools are applied to the study of sensitivity and selectivity enhancements of resistive fluctuation-enhanced sensors. General considerations are given for the upper limit of selectivity enhancement. The signal-to-noise ratio and information channel capacity of fluctuation-enhanced chemical sensors are compared to those of classical sensors providing a single output. The considerations treatment is generic, with a few concrete examples, and includes the estimation of scaling relations between the sensor size and speed of measurements, sampling rate, measurement time, signal power and noise power.

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