

# Multisignal digital biosensors- digital Biosensors integrated with enzyme logic systems

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**Abstract.** The abstract should briefly summarize the contents of the paper in 150–250 words.

**Keywords:** Biomolecular computing · Biosensors · enzyme logic gates · biosensing · biocomputing systems · enzyme logic circuits · biomedical applications

## 1 Introduction

- common biosensing devises are based on a single input
- high-fidelity compared
- closed loop/feedback loops possible (sense/act/treat)
- rapid and reliable assessment of overall physiological condition
- could initiate optimal timely therapeutic intervention
- application og biomolecular logic systems for analystic purposes could yield a novel class of biosensors: many input signals and binary outputs
- logically processed feedback between drug appl. and physiological conditions can signifacntly imprive drug targeting and efficiency
- Biosensors + enzymes

## 2 concept

- Biosensors: layers
- Biocomputing: concept
- combination concept

## 3 Biosensors with Biocomputing = biochemical logic systems

Biosensors logically processing multiple biochemical signals  
-such procassed information produces a final output yes/no  
- boolean logic networks composed of biomolecular systems

- multiple target analytes(inputs) for enzyme gates

- high-fidelity compared
  - closed loop/feedback loops possible (sense/act/treat)
  - rapid and reliable assessment of overall physiological condition
  - could initiate optimal timely therapeutic intervention
  - biosensors + enzyme logic gates
  - allows direct coupling of signal processing with chemical actuators
  - application of biomolecular logic systems for analytic purposes could yield a novel class of biosensors: many input signals and binary outputs
  - logically processed feedback between drug appl. and physiological conditions can significantly improve drug targeting and efficiency
  - difficulties: complexity by assembling individual logic gates into complex logic networks (intelligent by molecular logic) (43-34-67)
  - new approach for the sensor design and operation, interfacing biocomputing system and electronic transducers
- example

## 4 possible application

- state of the art
- diabetes
- sclerosis
- brain trauma

## 5 considerations

- Requires: interface of biocomputing systems + electronic transducer
- Therefore
- scalability (increasing number of logic gates)
- complexity (coupling of gates and non boolean elements)
- composition, preparation and immobilization of the biocomputing surface layer
- layer by layer
- optimal surface confinement
- careful engineering of the enzyme microenvironment (on transducer surface) for performance
- biocomputing layer + transducing layer + combine individual logic-gate elements

## 6 Conclusion

good but needs a lot of work sums up bla

## 7 Biosensors

- single input

## 8 Biosensors with Biocomputing = biochemical logic systems

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Beispiel

- Analyze protein libraries associated with multiple sclerosis

considerations

## 9 biocomputing

- most represent only the proof of the concept /possibility of performing computing with use of biomolecular systems
- not practical
- biomolecular logic systems
- challenges scaling up the complexity of the systems by networking the individual parts of a logic circuit

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