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# Mathematical modeling of cancer: challenges and perspectives towards a tailored therapy

**Andrea Signori**  
Università di Milano-Bicocca



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## Abstract

In the last decades, one of the most ambitious challenge that scientists had to face is the understanding of tumor growth dynamics. Despite the disease is far to be understood, lots of efforts have been proposed to capture the complexity of these biological and chemical phenomena. For the mathematical side, the diffuse interface approach applied to describe tumor evolution through PDEs have successfully employed in many instances.

The fundamental model we are going to analyze consists of nonlinear coupling between a Cahn-Hilliard-type equation for the tumor phase with a reaction-diffusion equation for the surrounding nutrient. From the medical viewpoint, the interest stems from the fact that this new information can be achieved without harming the patient and it may help the doctors to tailor a more personalised therapy.

Some basic introduction concerning the modeling and further mathematical analyses such as well-posedness and optimal controllability will be discussed.



## Keywords:

Tumor growth · evolution equations · phase-field · Cahn-Hilliard equation · mathematical modeling

*"Obvious" is the most dangerous word in mathematics. - Eric Temple Bell*