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Moderate Electric Fields application as a biotechnological tool in food processing

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Moderate Electric Fields (MEF) provide a uniform, rapid and energetically very efficient means of processing foods (mostly by heat). This has been known for over a century and has finally found its place among food processors, as MEF industrial equipments are being installed worldwide in growing numbers and in a variety of applications. This happened after technological issues such as electrode corrosion and adequate temperature and power control systems were solved.

Less unanimous are the so-called "electrical effects" of MEF, namely over microorganisms and enzymes. Despite of this, research efforts have consistently shown that it is possible that the presence of an electric current may induce changes leading to microbial or enzyme inactivation. These effects may be further enhanced by temperature, in a synergistic combination that may be advantageous when applied to the processing of foods: decreased degradation of nutrients, colour, aroma or

texture; lower energy consumption; reduced processing time, or a combination of these.

Our proposal is that it is possible to take advantage of the "electrical effects" of MEF to induce changes in biomolecules (e.g. proteins) which will in turn change their functionality. If the origin of such changes and their nature are understood, it will be possible to tailor such molecules towards specific applications (e.g. gelling agents, texturizers, activation/deactivation of functional groups, etc.).

In this work we will summarize the activities of our group regarding the use of MEF in food processing applications, with a particular emphasis on their potential to change the functional properties of proteins and applications thereof.