

## NON-EQUILIBRIUM PROCESSES IN SEMICONDUCTOR CRYSTALS AND SUPERLATTICES DEFECTIVE BY DISLOCATIONS

Liliana Restuccia<sup>1,\*</sup>, David Jou<sup>2</sup>

<sup>1</sup>Department of Mathematical and Computer Sciences, Physical Sciences and Earth Sciences, Messina University,

<sup>1</sup> Viale F. Stagno D'Alcontres, 98166 Messina, Italy

<sup>2</sup>Departament de Física, Universitat Autònoma de Barcelona, 08193, Bellaterra, Catalonia, Spain

<sup>2</sup> Institut d'Estudis Catalans, Carme 47, 08001 Barcelona, Catalonia, Spain

\*lrestuccia@unime.it

### ABSTRACT

The behaviour of dislocations in semiconductor crystals and superlattices is one of the frontiers in the so called "dislocation engineering", because it has a direct influence on mechanical properties (plastic behaviour, strain relaxation), on transport properties (heat transport, electric transport, and thermoelectric energy conversion) and in optical properties (LED diodes, semiconductor lasers). In this paper, in the framework of the extended irreversible thermodynamics with internal variables

[1-5], a model for semiconductor crystals and superlattices with dislocations is proposed (see also [6]) in order to study the thermal, electric, mechanical and geometrical structure of these materials. Constitutive equations for these systems, the rate equations for heat flux and the internal variables are derived in linear approximation. The local structure of dislocation lines is described by a dislocation tensor introduced by the authors. The obtained results may have relevance for optimized thermoelectric devices, for miniaturized semiconductor lasers and in other technological sectors.

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