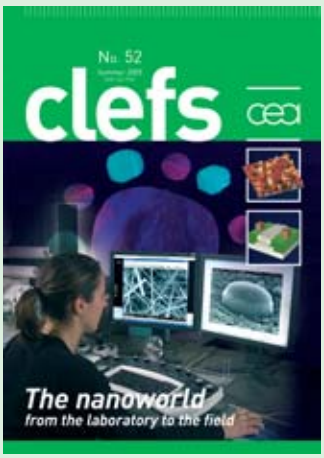

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Main image:
The Zeiss scanning electron microscope (SEM) installed in December 2004 at CEA Grenoble produces images of the sample surface at nanometre-scale via electron projection.
Artechnique/CEA

Background image:
Fluorescent nanocrystal-polymer composites under a UV light.
Artechnique/CEA

Inset:
Top: Atomic force microscopy image of CdTe quantum dots on a ZnTe surface.
CEA

Bottom: architecture of a multi-gate MOS transistor with metallic source and drain produced with extensions for increasing the injection speed of charge-carriers into the channel (CEA-Leti patents).
CEA/Yuvanoe

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Editorial

Nanotechnologies have only been described as a field of activity in their own right for the last few years, but they already cover an impressively wide range of applications, some at our fingertips and others on the horizon. How? Primarily because nanotechnologies are at the crossover of several other technologies, thus multiplying their potential. This is particularly evident at the junction between microelectronics - and soon nanoelectronics - and biotechnologies. Naturally, underscoring this technological advance we find what have come to be known as the nanosciences, which is basically just another term given to fundamental research initiatives that have been led for many years in both the life sciences and the physical sciences.

At the CEA, we are now on home soil – ideally placed at the crossroads of these converging technologies, ready to build for the future. And this edition of *Clefs CEA* has been designed to show just that. In electronics, the CEA has long been a front-runner, from upstream research on the intimate properties of matter to the downstream design of the systems and components that have made the reputation of its Electronics and Information Technology Laboratory (Leti), geared directly to industrial and therefore market expectations. The development of ultimate electronics, which represents the bridge between upstream and downstream, is progressively making its way from dream to reality, and is one of the spotlight features in this issue.

The second chapter focusing on the "building blocks" of the nanoworld includes certain developments that, while initiated by other research bodies, the CEA has positioned itself to take on and develop. Hence, the CEA has been working with the most advanced nanostructure observation and handling tools available, as reported in chapter three.

The fourth chapter, while not fully comprehensive, outlines a certain number of nanotechnology applications that highlight the first breakthroughs made by the convergence between microelectronics and the life sciences.

The reactions to these nanotechnologies include a certain degree of reticence and even staunch opposition due to the potential capabilities ascribed to the nanosciences, but never before in the history of science and technology have the social and societal implications been taken account of from such an early stage, and this is equally true for the various associations and institutions involved as for the decision-makers and the researchers themselves.

> Bernard Bouquin

This issue is dedicated to the late Jacques Dalla Torre, co-author of one of the feature articles, who passed away due to illness on February 26 of this year.

The CEA is one of Europe's leading technological research organizations in energy, defence, safety, and new health and information technologies. Through the gamut of its diverse research programs, it pursues two major goals: one is to become the leading technological research organization in Europe, and the other is to guarantee the long-term sustainability of nuclear deterrence, one of its historic briefs as French Atomic Energy Commission.
Its strengths include an engineer-researcher cross-culture promoting the creation of synergies between basic research and technological innovation, outstanding facilities coupled with hands-on involvement in industrial and economic networks, running around 350 licensing agreements and a portfolio of 1,180 patents either active or filed* and over 610 priority patents with licences or out-licensing agreements at year-end 2004.

The CEA boasts 9 research centres France-wide and employs a 15,000-strong workforce. It manages an annual budget of almost €3B, is strongly anchored at regional level, and has built sound partnerships with other research institutions, local authorities and universities.
Internationally renowned as an expert in its skills areas, the CEA has the special status of public scientific, technical and industrial research establishment, and is a key figure in the European research arena.
A major player in research, development and innovation, the CEA has been behind the creation of 93 new high-technology sector businesses since 1984.

*counted as per current international guidelines