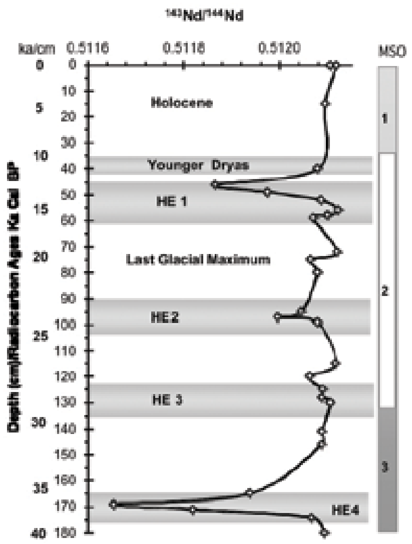
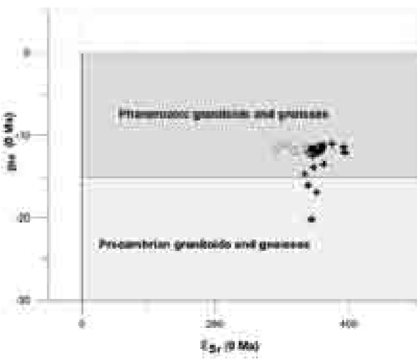
isotopes by TIMS, in the Isotope Geology Laboratory of the University of Aveiro. The obtained 143Nd/144Nd and 87Sr/86Sr ratios vary from 0.512072 to 0.511604 and from 0.732273 to 0.725140, respectively. Significantly, the lowest Nd isotope ratios were obtained in samples from HE layers, namely in HE1 (~ 15 ka BP), HE2 (~ 24 ka BP) and HE4 (~ 38 ka BP). These results suggest a strong contribution of continental crustal sources significantly older than the Variscan basement for events HE 1, 2 and 4. The most likely provenance of the coarse clasts deposited during these three events lie probably in NE America, where Precambrian basement occupies large areas, and the carrier icebergs should be fragments of the Laurentide Ice Sheet. This provenance is probably related to extremely cool conditions.
In contrast, the HE3 (~ 28 ka BP) layer displays Nd isotope ratios in the range of the compositions of the most common sediments in the core and, therefore, its IRD should have European source(s).





piezoelectric PLLA as a platform for tissue growth

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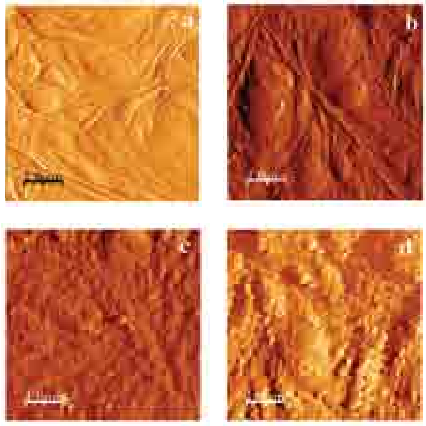
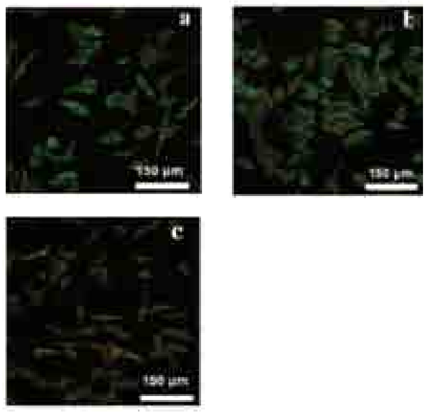
Imagine an implantable platform made of an intelligent material capable of thwarting bone resorption by simple electrical stimulation. PLLA, a FDA approved biomaterial, is one of the few candidates than can fulfil the challenge. Physical exercise is known to increase bone mass but the exact processes responsible for the bone growth were not untangled yet. The piezoelectric character of organic component in bone has been pointed as a possible "transducer" (converter of mechanical energy into electrical and vice versa) in bone tissue synthesis but the exact mechanisms are still unknown. The use of some piezoelectric materials to correct bone defects has demonstrated to promote a faster bone growth comparing to non piezoelectric materials.
Poly (L-lactic) acid (PLLA), a semi-crystalline polymer, is currently being investigated for bone regeneration purposes since it possesses a valuable combination of properties. Beyond the biocompatibility, biodegradability and adjustable physical properties, PLLA is piezoelectric. In vivo, piezo effect is expected to create charges in the surrounding area of bone and enhance regeneration processes. This research intends to shade light on how the polarization of a piezoelectric substrate influences bone growth processes.





PLLA as spin coated films, solvent casted films, nanofibers and scaffolds have been prepared. PLLA was poled by different processes: by corona poling for macroscopic polarization or locally poled at the nanoscale level by applying a DC field through a piezoresponse force microscopy (PFM) tip. The molecular orientation induced by the electrical field was checked by imaging by PFM.
The electrically induced polarization of PLLA was investigated regarding its stability over time and its effect on human proteins and osteoblast-like cells. *In vitro*, we have shown for the first time that polarization and surface charges in PLLA have an effect on biological events occurring during bone regeneration. Polarization significantly enhances fibronectin adsorption as well as osteoblast-like cells adhesion, spreading and proliferation. We also demonstrated that in semi crystalline PLLA the polarization decay starts only after 10 days; time enough to trigger and maintain the adhesion of proteins and proliferation of cells.