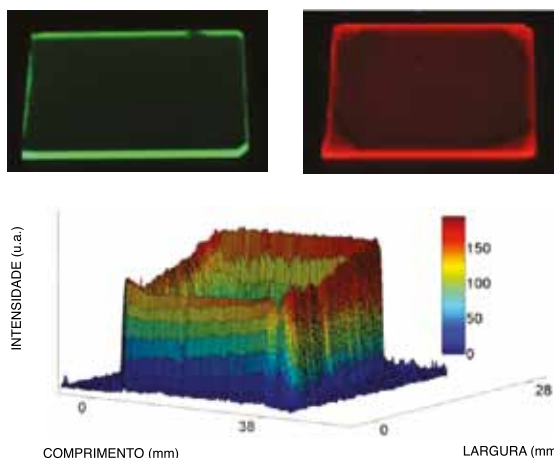


# LUMINESCENT SOLAR CONCENTRATORS BASED ON ORGANIC-INORGANIC HYBRIDS

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Solar energy is the most abundant and reliable source of energy. High conversion efficiency is necessary for cost effectiveness. The efficiency of the Si-based photovoltaic solar cells is limited due to the poor overlap between the Si absorption and the Sun emitting spectrum.

Highly efficient green-, and red-emitting lanthanide-based organic-inorganic hybrids have been used to increase the conversion efficiency of Si-photovoltaic cells, through the implementation of Luminescent Solar Concentrations. The Lanthanide-based organic-inorganic hybrids – processed as thin films on transparent substrates – efficiently convert the ultraviolet sunlight component (not absorbed by the Si-photovoltaic cells) into visible radiation, as illustrated in figure 1. The light emitted at the film surface is trapped within the waveguide substrates and guided to the edges, through total internal reflection, where it emerges in a concentrated form (see figure 2) that can be collected by the photovoltaic cells.



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**FIGURE 1**

Emission from organic-inorganic hybrids materials doped with (left) Tb<sup>3+</sup> and (right) Eu<sup>3+</sup> ions excited at [1,2].

**FIGURE 2**

Intensity map of the red pixel of the Eu<sup>3+</sup>-based organic-inorganic hybrids excited at 365 nm [2].