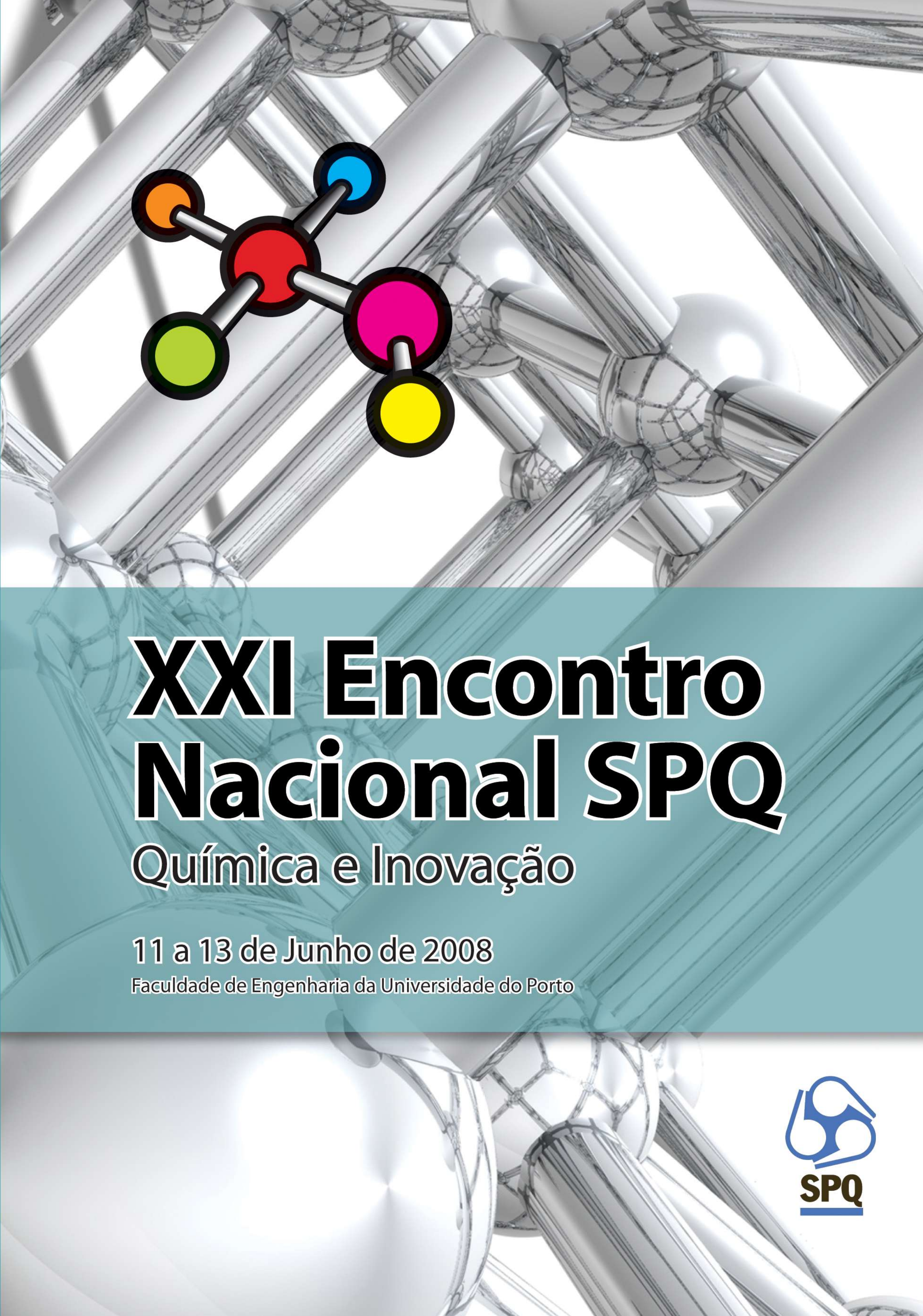

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TITANIUM DIOXIDE SUPPORTED Pt CATALYSTS FOR CINNAMALDEHYDE HYDROGENATION

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The use of reducible metal oxides as supports in the selective hydrogenation of unsaturated aldehydes has been studied for many years. It is well known that reduction of group VIII metals supported on these materials, when performed at high temperatures, produces a strong electronic effect, named strong metal support interaction (SMSI), that can enhance selectivity towards the desired C=O bond.

In this work, two different types of TiO_2 were used to support Pt: (a) prepared by an acid-catalyzed sol-gel process starting from the alkoxide precursors [1] (SG, 100% anatase); (b) commercial Degussa P-25 (DEG, 80% anatase and 20% rutile). The photochemical deposition procedure, aiming at 5 wt. % Pt load, was carried out at atmospheric pressure and ambient temperature, as described elsewhere [2]. The resulting materials were calcined and reduced at 773K. The obtained catalysts were tested in the liquid-phase hydrogenation of cinnamaldehyde, performed in a 100 mL stainless steel reactor at 363 K and 10 bar, total pressure.

After calcination at 773K there was no noticeable difference in the X-ray diffraction pattern of Pt/DEG whereas in Pt/SG, *ca.* 35% of anatase had transformed to rutile phase. This increase in rutile content was accompanied by a specific surface area decrease. Regarding the catalytic results, Pt/SG exhibited the highest selectivity towards cinnamyl alcohol (COL). The Pt/DEG catalyst had an overall worst performance, in spite of producing lower amounts of hydrocinnamaldehyde (HCAL) and hydrocinnamyl alcohol (HCOL) (Table 1).

Table 1. Selectivity results obtained at 50% conversion of cinnamaldehyde.

Catalyst	S_{COL} (%)	S_{HCAL} (%)	S_{HCOL} (%)	S_{OTHERS} (%)
Pt/DEG	56	3	8	33
Pt/SG	82	6	12	0

Catalysts prepared by a simple photodeposition method revealed an outstanding activity and selectivity for hydrogenation of cinnamaldehyde into cinnamyl alcohol. SMSI effect was found to be responsible for the elevated catalytic performance.

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