Supplementary data for

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Table S1- Costs and relative production of lithium raw materials modified and adapted from Ebensperger et al. (2005)

application	raw material	relative production volume	estimated cost (USD/kg)
Polymers	Li_2CO_3	5	4
Pharmaceuticals	butyllithium	5	15
Synthetic rubber	butyllithium	5	15
Light Al	Li_2CO_3	6	2
Glass-ceramics	Li_2CO_3 and lithium minerals	8	2
Air conditioning	LiBr	11	6
Batteries	Li_2CO_3	12	12
Glazes and enamels	Li_2CO_3	13	2
Lubricants	LiOH	17	4
As an additive in a wide range of other applications	Li_2CO_3	18	3

Table S2. Percentage of lithium compounds in the production of several glassy materials, (modified and adapted from Fernández Navarro, 2003).

Glassy products	Li_2O wt. %	Raw materials in the batch	relative % (EU industry)
TV tubes	0.5-2.0	Spodumene, petalite and Li_2CO_3	1
Pyroceram	0.4-4.0	Spodumene and Li_2CO_3	8
Glass fibers	0.1-0.5	Spodumene	1.4
Security glasses	0.1-1.0	Several lithium minerals	It is function of each mineral
Wine, water and small perfume bottles, vacuum jars or lab vessels, etc.	0.1-4.0	Several lithium minerals and Li_2CO_3	<<1
Optical glasses	0.1-0.5	Li_2CO_3	7.2

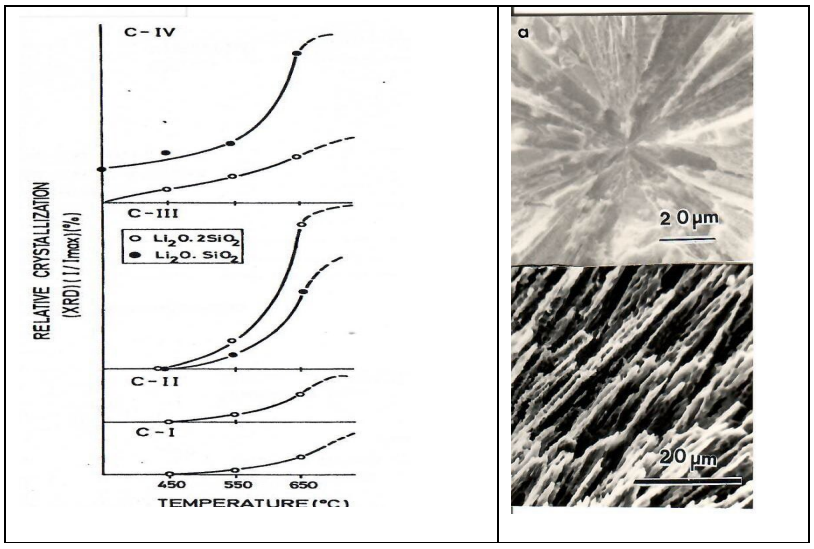

Figure S1.— Left: evolution of crystal growths of lithium silicates with 2 hours of thermal treatments from Li_2O-SiO_2 glasses with different compositions versus the treatment temperature; Right: microstructure of $Li_2O.2SiO_2$ in a spherolite crsytalllisation, inside these glass-ceramics and crystallization layers parallel to the surface (Rincón, 1992).

In this vitreous system including CdO, it was also investigated the effect of neutron irradiation on the properties of glasses and respective glass-ceramics, because it is well known that nuclear α, β, γ and neutron irradiation usually affect glass properties. They were observed numerous and very clear visible damage tracks by TEM in these glasses after γ-irradiation in the Nayade source (Co^{60}) of the Madrid Nuclear Center (previously named as JEN (Junta de Energía Nuclear); nowadays, CIEMAT (Centro de Investigaciones Energéticas y Medio Ambientales) (Rincón, J.Ma., unpublished results).

Table S3. Average final properties of new iridiscente aventurine glasses and glass-ceramics useful for tiles and obtained from mixtures of amblygonite wastes with muscovite (M) and vermiculite (V). Li_2O content are in the range: 3.60- 3.64 (wt. %) (table adapted from Callejas, 1988)

Property/ material	Ma5 glass	Ma5 glass-ceramic	Va5 glass	Va5 glass-ceramic
Density (gcm^{-3})	2.46	2.40	2.64	2.57
Thermal expansion (20-300ºC) $x10^{-6}$	6.1	4.9	8.5	4.2
Microhardness Vickers ($kg\ mm^{-2}$)	596	624	660	695
Toughness ($MPa\ m^{1/2}$)	1.50	1.76	1.41	1.65
Thermal Treatment ((ºC/ 1 hour)		crystalline phases		crystalline phases
800		-		forsterite
900		spodumene		forsterite
980		spodumene		cordierite+ enstatite
1160		spodumene		cordierite+ forsterite

Table S4. Composition systems with their main crystalline phases synthetized in glass- ceramics glazes for covering of tile surfaces. (Research developed, under contract, for some industries of the Ceramics Castellon Cluster).

Compostition system	**Main crystalline phases**	**Microstructure of crystals**
Li_2O-CaO- MgO-Al_2O_3-SiO_2	spodumene, cordierite, diopside and anorthite	Rounded, dot and square
Glass-ceramics (pyroflam® type)	cordierite and spodumene	Prismatic and grained
Li_2O-ZnO-BaO-Al_2O_3-SiO_2	gahnite, willemite and celsian,	Needle like
Li_2O-K_2O-Al_2O_3-SiO_2	leucite	Whiskers 1-2 micron

Figure S2.— General view or external aspect of the new dental bioglass-ceramic developed with lithium disilicate crystallizaton (Callejas and Rincón, 2012).

This Figure shows glass-ceramics for dental applications have been developed in a specific composition inside the complex Li_2O-K_2O-Al_2O_3-B_2O_3-SiO_2-P_2O_5 system and with three additives: La_2O_5-ZrO_2-CaF_2. They include also 0.5 wt. % La_2O_5 and 1.0 wt. % CaF_2, and show high mechanical and abrasion resistance due to the addition of ZrO_2 (2.5 wt. %). In these dental applications the main crystalline phase was a lithium disilicate crystallization

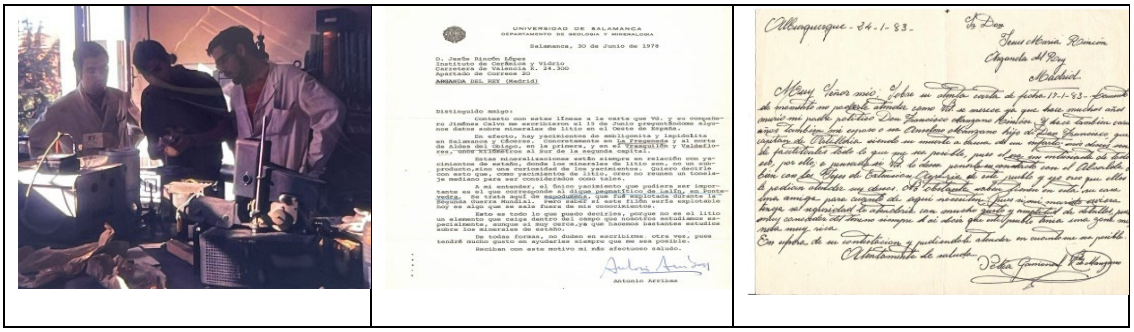

Figure S3.— left) Melting of the original glass for obtention of the first glass-ceramic at the ICV-CSIC (Instituto de Cerámica y Vidrio, Consejo Superior de Investigaciones Científicas in 1971) formulated inside the spodumene-cordierite system. Center) Letter from Professor Arribas (Salamanca, 1978), answering to the requirement for initiation of glass-ceramics research about lithium resources in the Spain-Portugal border. Right**)** Letter addressed in 1983 from the owner of a lithum deposit in Alburquerque (Badajoz, Spain) (original written by Petra Gamonal, Mr. Manzano's widow, the previous owner of this mine).