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## Attempt to repair sanitary ware pieces by laser technology

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Traditionally, ceramic companies are completely re-fired with the ceramic pieces in order to correct small defects with few square millimetres, in sanitary ware pieces. This process represents high energy consumption, increasing the cost production. This work presents an attempt to solve this problem using a CO<sub>2</sub> laser technology to repair those defects, preventing the extra costs associated with a re-firing. Until now several approaches had been done using laser technology to solve the problem without success. Despite the method shows promising results, all situation led to the development of a circular crack around the defect, due to the elevated thermal gradients caused by laser radiation. A new approach was done using new materials based on sol-gel technique to fill out the cracks after laser treatment. The idea is the use of sol-gel based material and the re-firing post laser processing at lower temperature and time in order to confer the aesthetic aspect required for the commercialization of the pieces.

### Recent Publications

1. K. Osvay, I. Képiró, and O. Berkesi, "Laser treatment of white China surface," *Appl. Surf. Sci.*, 2006.
2. S. Rodríguez-López, R. Comesaña, J. del Val, A. Durán, V. M. Justo, F. C. Serbena, and M. J. Pascual, "Laser cladding of glass-ceramic sealants for SOFC," *J. Eur. Ceram. Soc.*, vol. 35, no. 16, pp. 4475–4484, Dec. 2015.
3. N. B. Dahotre and S. P. Harimkar, *Laser Fabrication and Machining of Materials*. Springer, 2008.
4. J. D. Majumdar and I. Manna, *Laser-Assisted Fabrication of Materials*. 2012.
5. X. Li, J. Wang, L. L. Shaw, and T. B. Cameron, "Laser densification of extruded dental porcelain bodies in multi-material laser densification process," *Rapid Prototyp. J.*, vol. 11, no. 1, pp. 52–58, 2005.
6. N. Basile, M. Gonon, F. Petit, and F. Cambier, "Processing of a glass ceramic surface by selective focused beam laser treatment," *Ceram. Int.*, 2016.

### Biography

N M Ferreira is a PhD in Physics Engineering; currently is a Researcher at i3N, Physics Department at University of Aveiro, Portugal. He had participated in several R&D projects on Material Science. He have experience as researcher in study and development of ceramics-based materials, prepared through conventional methods by melting, solid stated, with particular focus on laser processing (crystal growth – LFZ and surface sintering/modification). Present sample characterization skills include various techniques such as, electrical conductivity and magnetic properties of various oxide materials. Current focus materials are thermoelectrics, ferroelectrics and glass matrices doped with transition metals and rare earth for energy storage and conversion applications. Main expertise is related to structural, magnetic and electrical properties of materials prepared by laser processing.

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