

# Study of cladding materials based on boron enriched ceramics (and epoxy resin) to be used as shielding components

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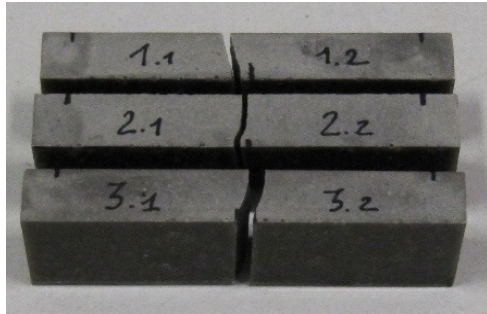
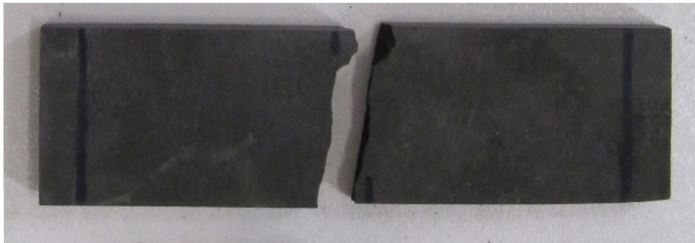
## Aims of the project:

- Study and characterization of boron enriched ceramic materials and epoxy to be used as cladding for neutron instrumentation components and hutch surfaces at ESS
- Investigation of the best recipes (ceramic+B<sub>4</sub>C and epoxy+colemanite)
- Determination of composition and firing temperature
- Preparation of test samples of ceramic and epoxy resin
- Mechanical characterization
- Neutron transmission characterization and comparison with available materials
- Neutron scattering characterization and comparison with available materials

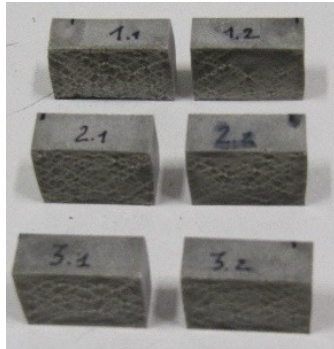
# Mechanical characterization

Ceramix

epoxy



3 point bending test



Compressive test

$\sigma_{comp} = 34 \pm 3 \text{ N/mm}^2$

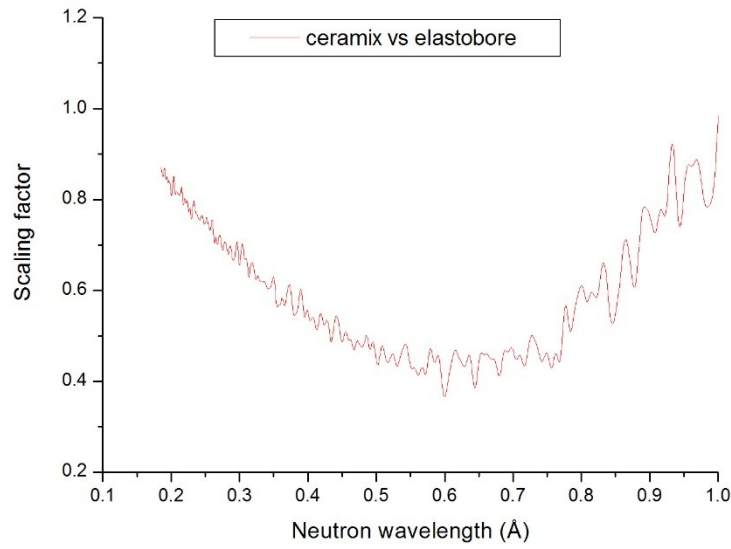
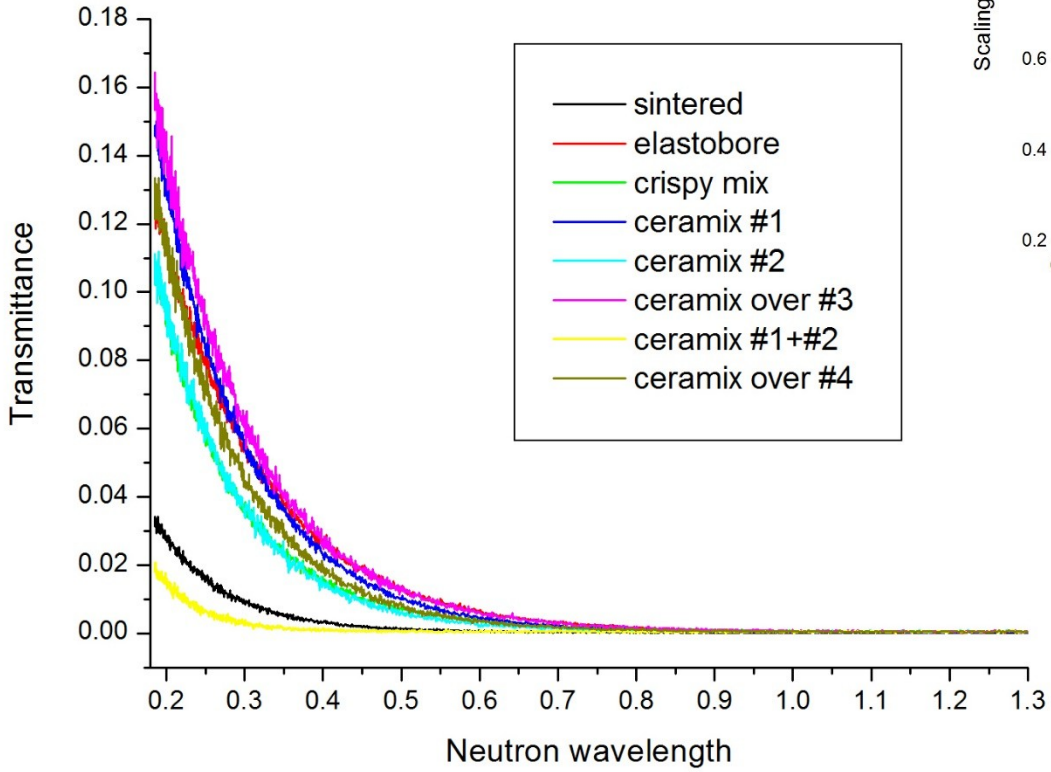
$\sigma_{flex} = 17 \pm 4 \text{ N/mm}^2$

$\sigma_{comp} = 90 \pm 2 \text{ N/mm}^2$

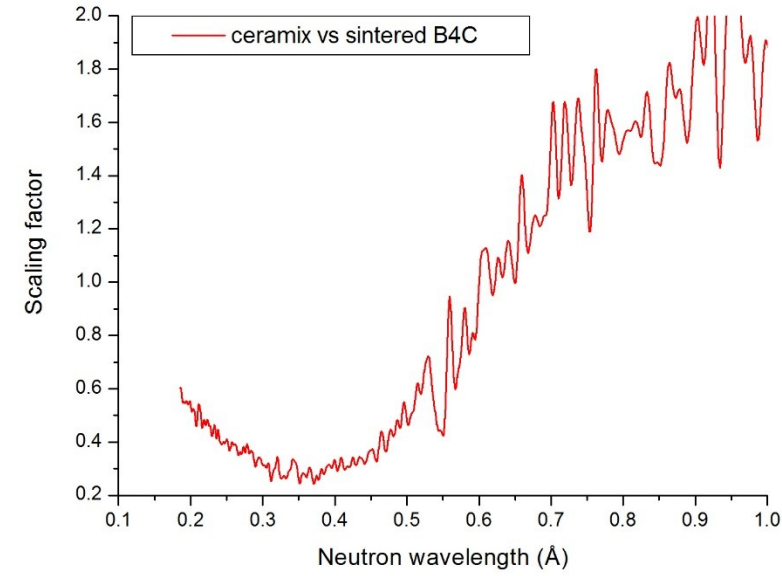
$\sigma_{flex} = 54 \pm 2 \text{ N/mm}^2$

# Neutron (and gamma) shielding measurements

Time of flight transmission measurements  
Transmittance and thickness scaling factor with respect to commercial materials



At short wavelength  
less ceramix thickness is needed  
to get the same shielding  
as elastobore or sintered



# Neutron (and gamma) shielding measurements

## High energy neutrons and gammas transmission measurements

Concrete and geopolymers results: transmittance and 1/e attenuation length (mm), filter 1 (n+), filters 1+4 (n)

