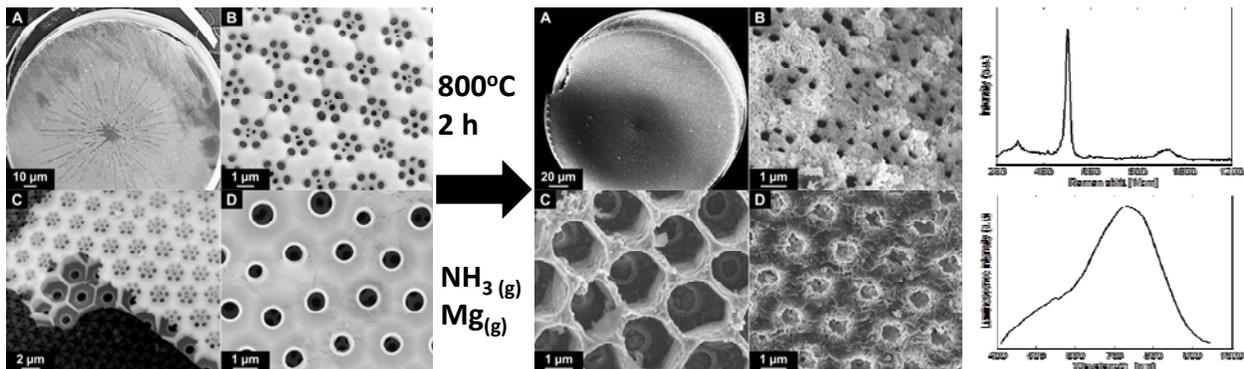


Synthesis and properties of silicon/magnesium silicon nitride diatom frustule replicas

Diatom frustule replicas mainly consisting of magnesium silicon nitride and nanocrystalline silicon have been obtained by simultaneous metallothermic reduction and nitriding of silica diatom frustules at 800°C. The frustule replicas retained most of the complex nanoporous structures from the original frustules in the conversion. The optical scattering, transmittance and luminescence properties of the replicas have been investigated. Luminescence was observed and attributed to the presence of silicon nanocrystals. Wavelength dependent diffraction of light was observed in bio-silica frustules but not in frustule replicas, which was attributed to surface coarsening of the replicas during the reaction. The light transmittance was found to be lower in frustule replicas and was consistent with absorption of light by Si nanocrystals.



SEM images of diatom frustules before and after reaction along with corresponding observed Raman shift and luminescence.

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Ref: I. A. Ødegård; J. C. Romann; A. Fossdal; A. K.Røyset; G. Tranell. Journal of Materials Chemistry A. 591 (2014) 175.