

Magnetic collagen

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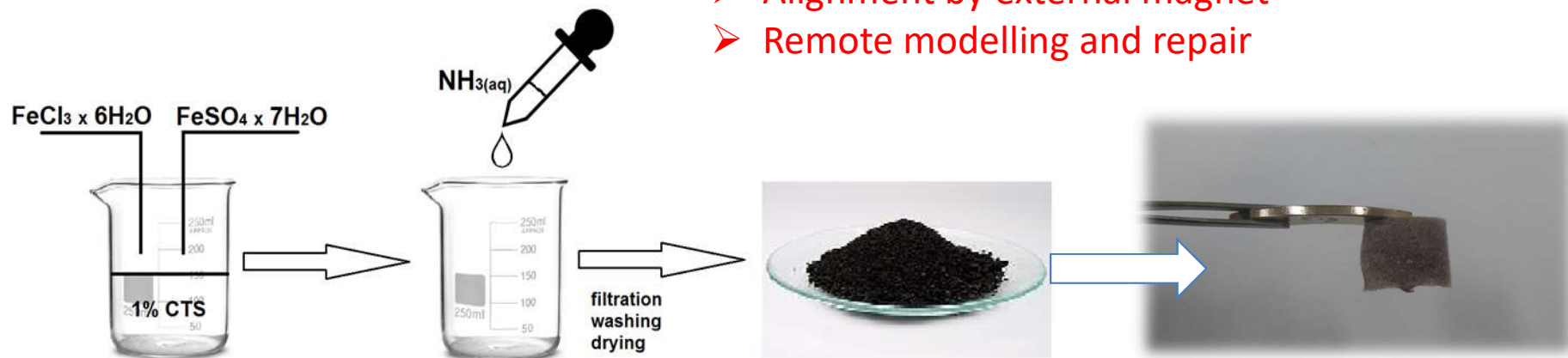
fot. Andrzej Romański
Source: <https://portal.umk.pl>;



Motivation

- ✓ Magnetic particles (MP) preparation
- ✓ Incorporation of MP to collagen gels
- ✓ Incorporation of MP to the collagen scaffolds

- To remotely control the orientation of collagen using external magnetic field
- Possibility of the reduction of wrinkles
- Alignment by external magnet
- Remote modelling and repair



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A. Sionkowska, S. Grabska. Incorporation of magnetite particles in 3D matrices made from the blends of collagen, chitosan and hyaluronic acid. *Advances in Polymer Technology* 2018.

Preparation of magnetic particles

- ✓ Preparation of magnetic particles coated with chitosan – precipitation method

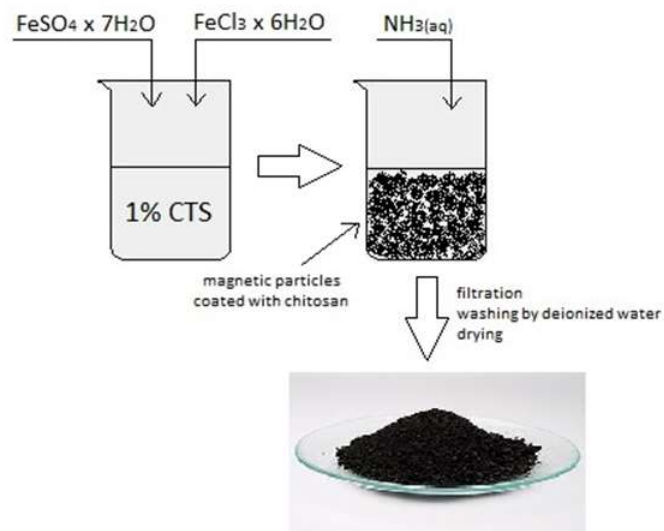


Fig. 1. The scheme of preparation magnetic particles coated with chitosan

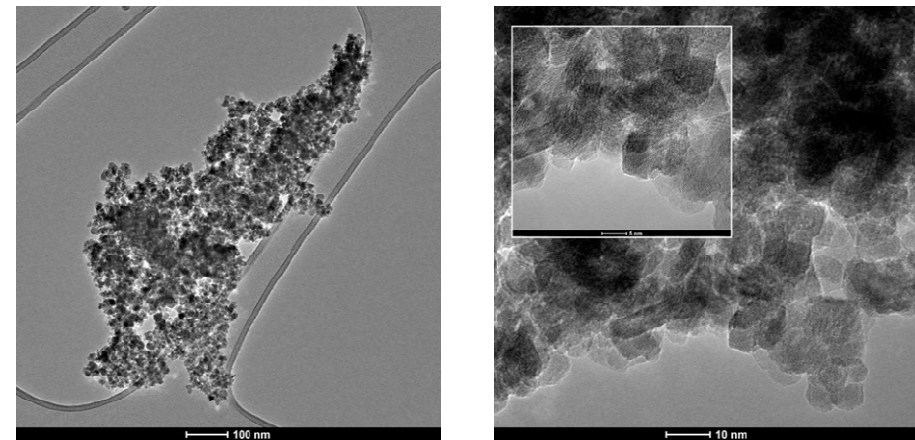


Fig. 2. TEM micrographs of magnetic particles

Incorporation and crosslinking

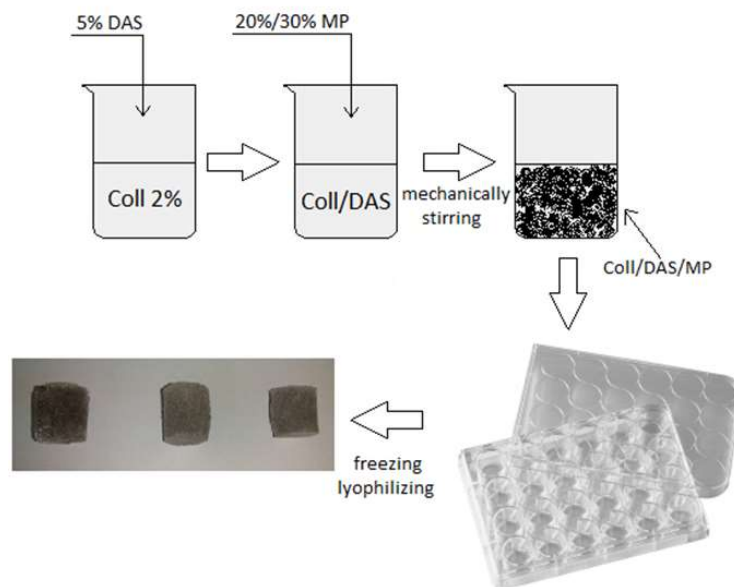


Fig.3. Scheme of preparation of collagen 3D materials cross-linked with dialdehyde starch (DAS) with addition of magnetic particles.

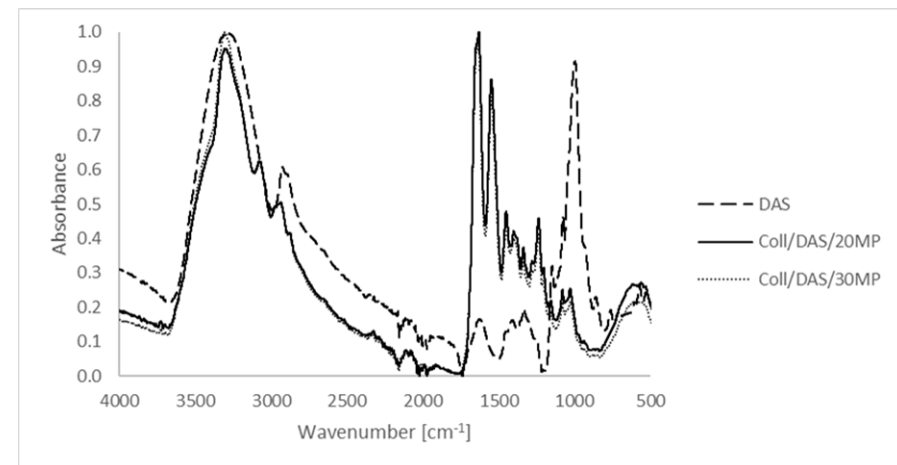


Fig. 4. The ATR-FTIR spectra of DAS, Coll/DAS/20MP and Coll/DAS/30MP

The result → Magnetic collagen

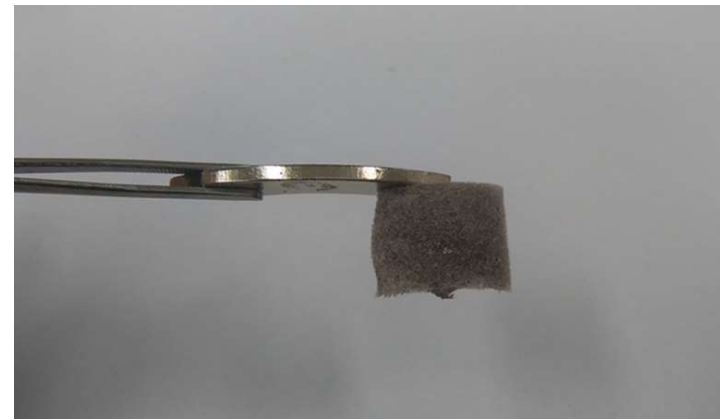
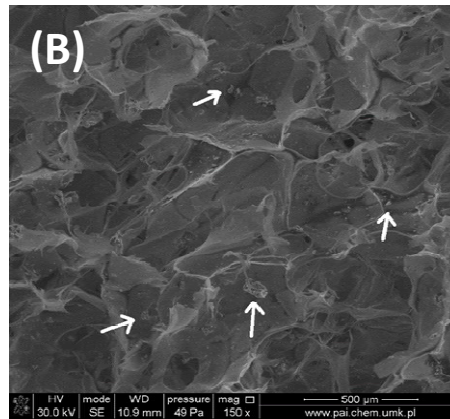
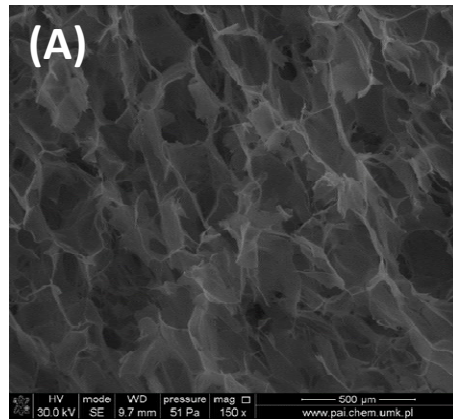


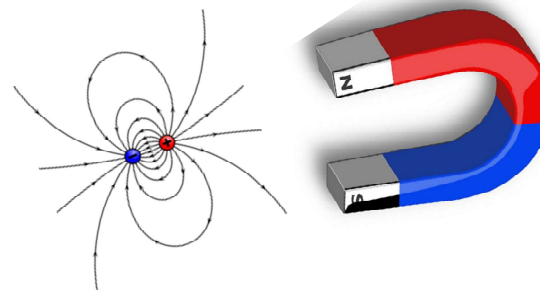
Fig. 5. SEM images of materials form: (A) collagen and (B) collagen cross-linked with DAS with 20% addition of MP

Fig.6. Magnetic collagen



The novelty of work

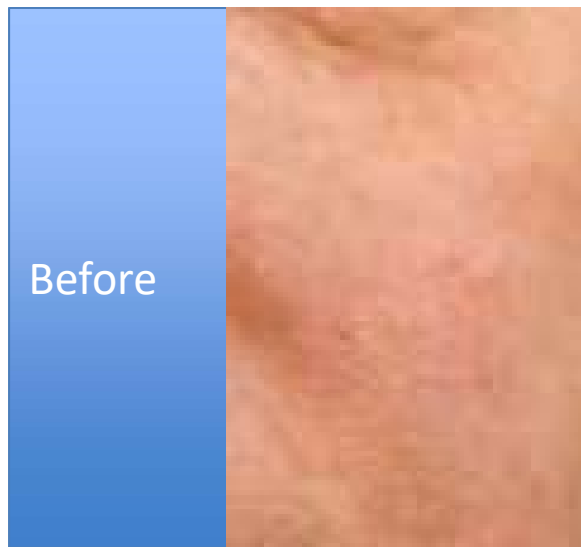
- ✓ The ability to remotely control the orientation in collagen type I using magnetic field
- ✓ Collagen magnetic films offer a beauty mask which action can be manipulated by external magnetic field
- ✓ 3D in vitro models show development in the field of tissue engineering and organ on a chip





Features and benefits:

- ✓ Improving the skin's tone and texture
- ✓ Smoothing wrinkles





Features and benefits:

- ✓ Controlling tissue engineering

