Composite biomaterials based on collagen with antimicrobial activity

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Introduction: Bone tissue engineering is a complex field of research involving pure regeneration, diagnosis and treatment of specific bone-related diseases such as osteoporosis, osteomyelitis, osteosarcoma. Considering the composite nature of bone tissue, the morphology induces the properties of bone tissue, the most biomimetic solution is based on composite materials based on collagen polymer and hydroxyapatite (COLL/HA) and their properties can be further corrected by loading with different an improvement of biological activity – from terostructures, drugs, drugs.

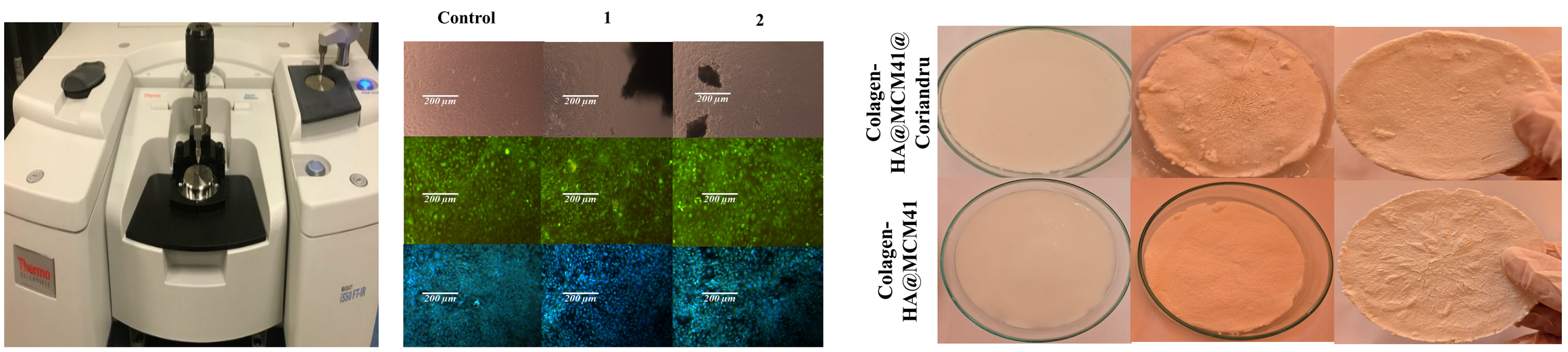


Figure 1. Phase contrast and fluorescence microscopy images

The purpose of this study was to evaluate antimicrobial activity of composite biomaterials based on collagen, hydroxyapatite, mesoporous silica (MCM 41) loaded with coriander oil (Col/HA/MCM-41/OIL composite materials).

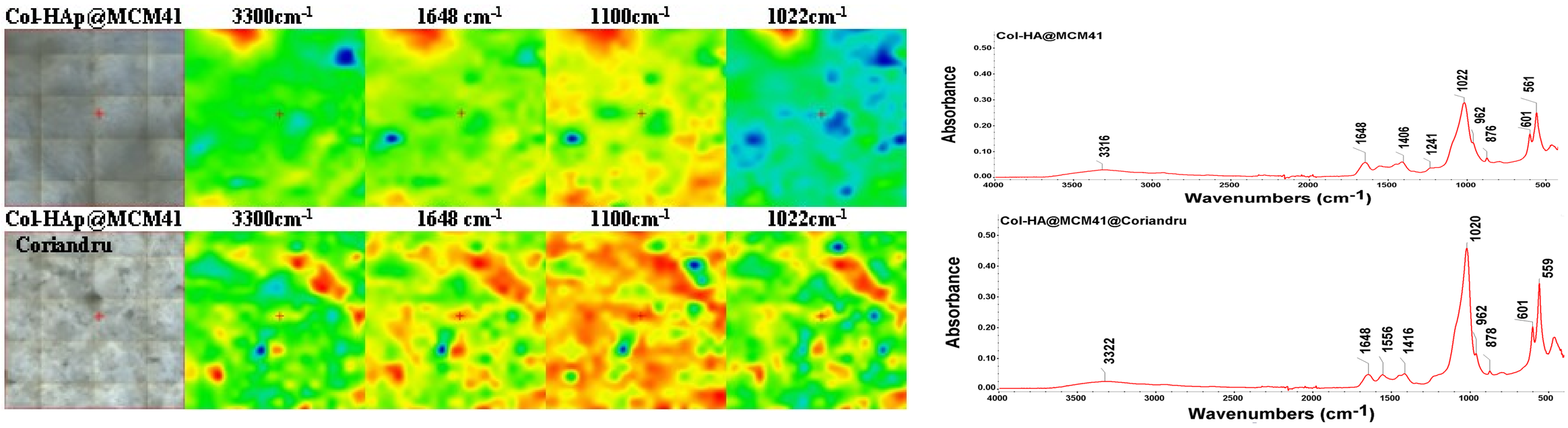
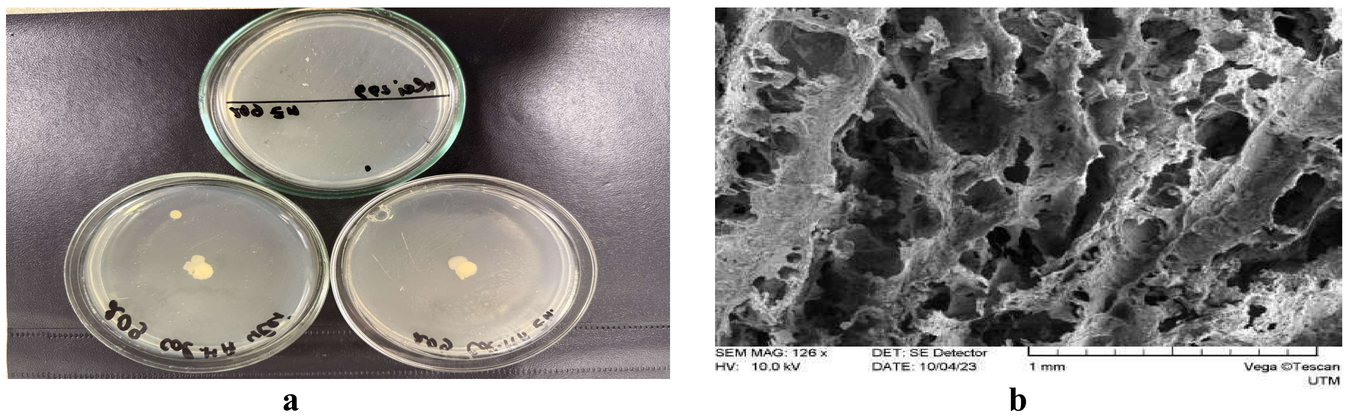


Figure 2. FTIR microscopy

Results: Col/HA/MCM-41/OIL composite materials were obtained and used in hard tissue engineering as drug delivery system.

The antimicrobial activity was analyzed by agar diffusion test. The bacterial strain Staphyloccocus aureus (t.209) was cultured on the medium, and the composite samples were placed on the agar surface. After the incubation period, the inhibition zones were visually examined.



a b

Figure 3. a) Antimicrobial activity Test, b) Scanning Electron Microscopy

Conclusion: The results of the diffusimetric test of Col/HA/MCM-41 composite materials loaded with coriander oil completely inhibited the growth of the Stafilococus aureus (t.209) strain, demonstrating a pronounced antibacterial efficacy.

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