

# Development and Application of Clinoptilolite-Argentum Based Preparations for the Healing of Burn Wounds

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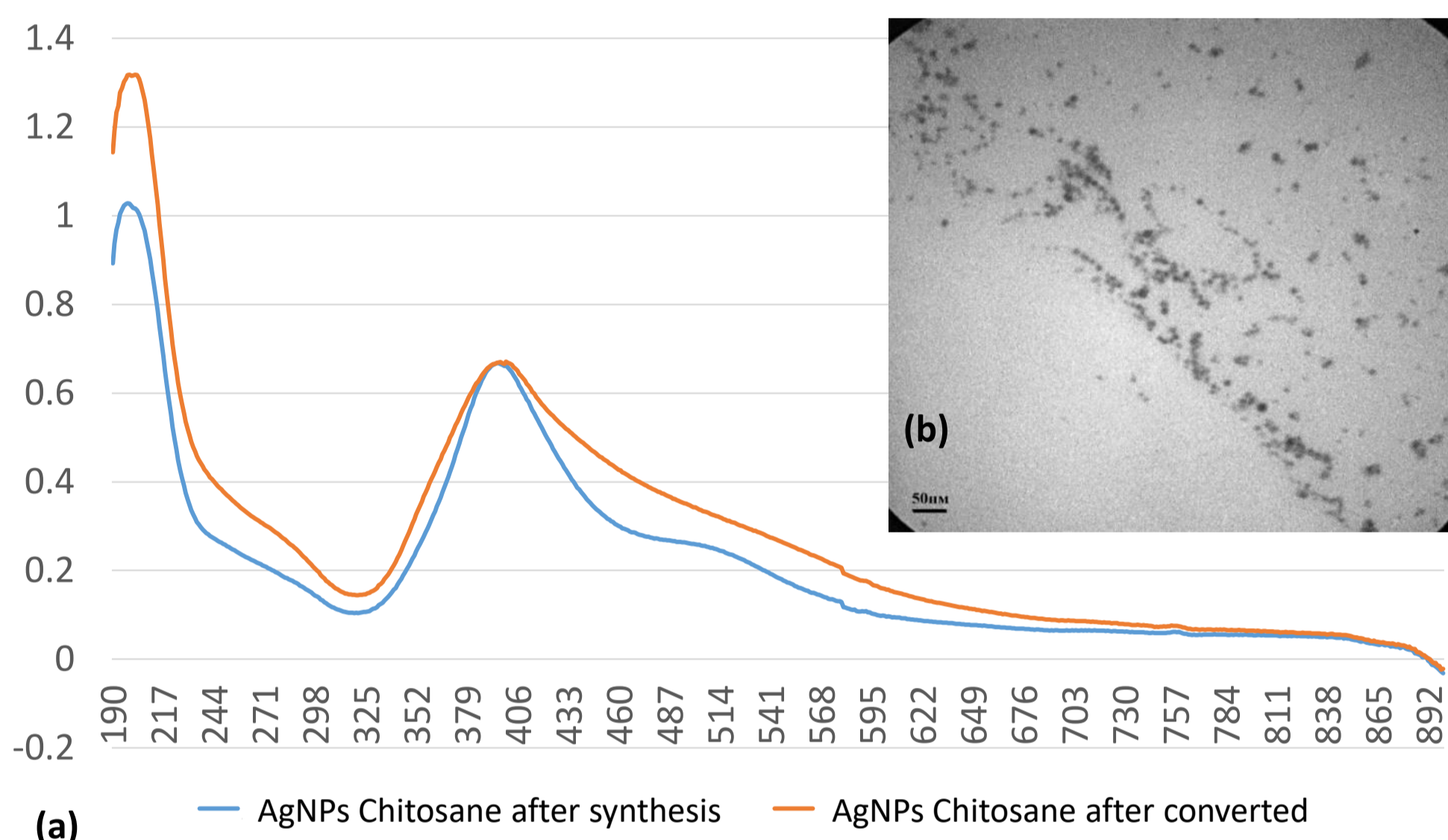
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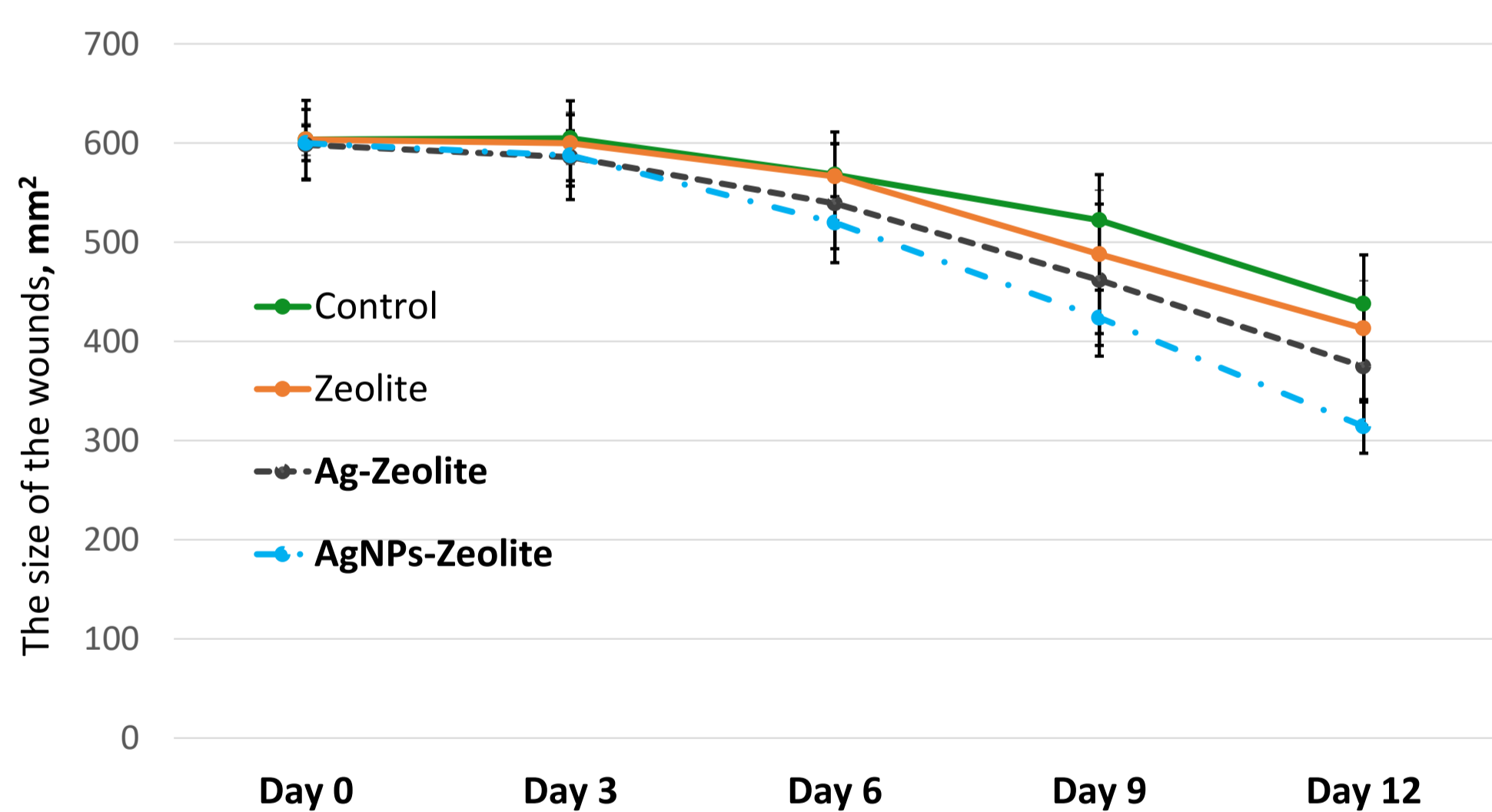
**Aim.** This study aimed to develop preparations based on clinoptilolite-argentum and argentum nanoparticles and evaluate their effectiveness in treating burn wounds in rats.

**Introduction.** Burn wounds are one of the major medical problem worldwide due complexity of the healing process. Development of new effective pharmaceutical compositions with active antimicrobial agents as argentum and supporting components as clinoptilolite sorbent for improving the wound healing is an important task for health care.

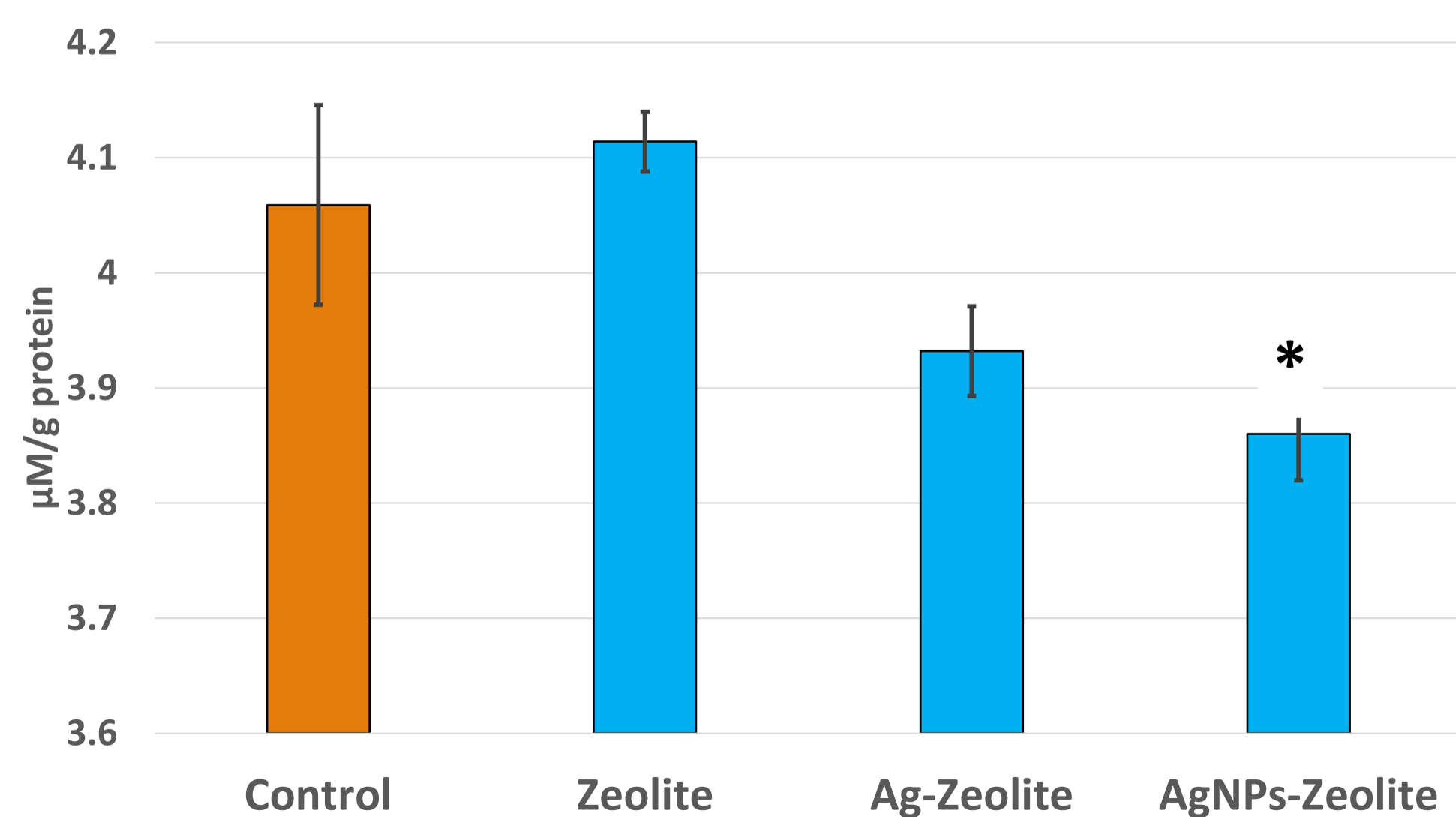
**Methods.** Ethics Commission of the Institute of Animal Biology of the NAAS approved all experimental procedures on animals in accordance with the Ukrainian current legislation. Second-degree burns with size 6 cm<sup>2</sup> were created on the dorsal area of 32 male rats under general anesthesia. The animals were randomly divided for 4 experimental groups (8 rats in each): animals from a control group were treated by saline solution; group 1 - pure clinoptilolite; group 2 - clinoptilolite with metallic argentum; 3 - clinoptilolite with chitosan-argentum nanoparticles. On Days 0, 3, 7, 9 and 11 of treatment wound areas in all animals were measured. On Day 12, all rats were euthanized and burn samples for histological and biochemical examinations were collected.



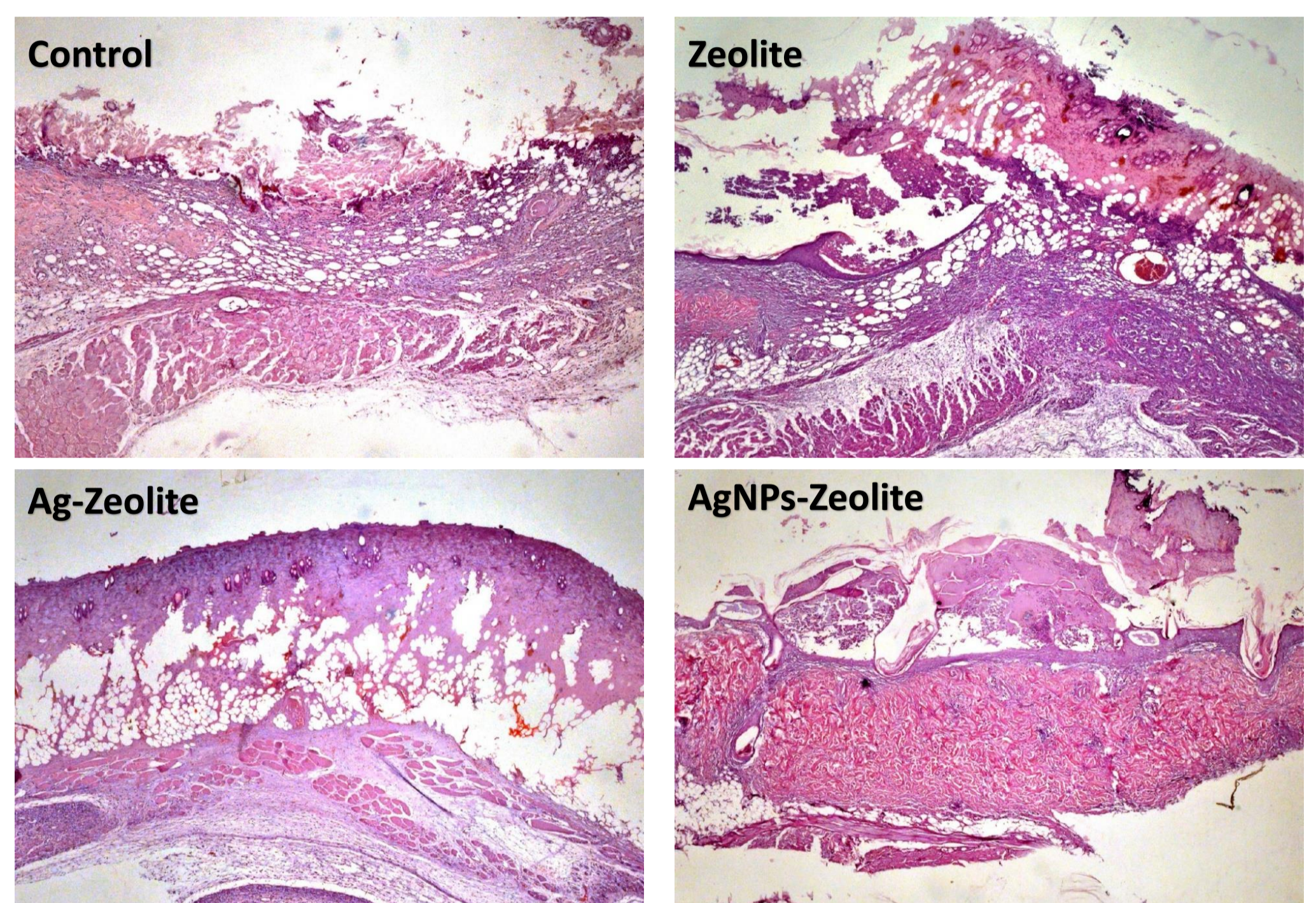
The extinction peaks at a wavelength of 400 nm for AgNPs-Chit (a) immediately after synthesis and after being converted into a dry form, indicate the formation of spherical nanoparticles with sizes ranging from 9 to 12 nm, without any observable agglomeration changes. This is confirmed by Transmission Electron Microscopy studies (b).



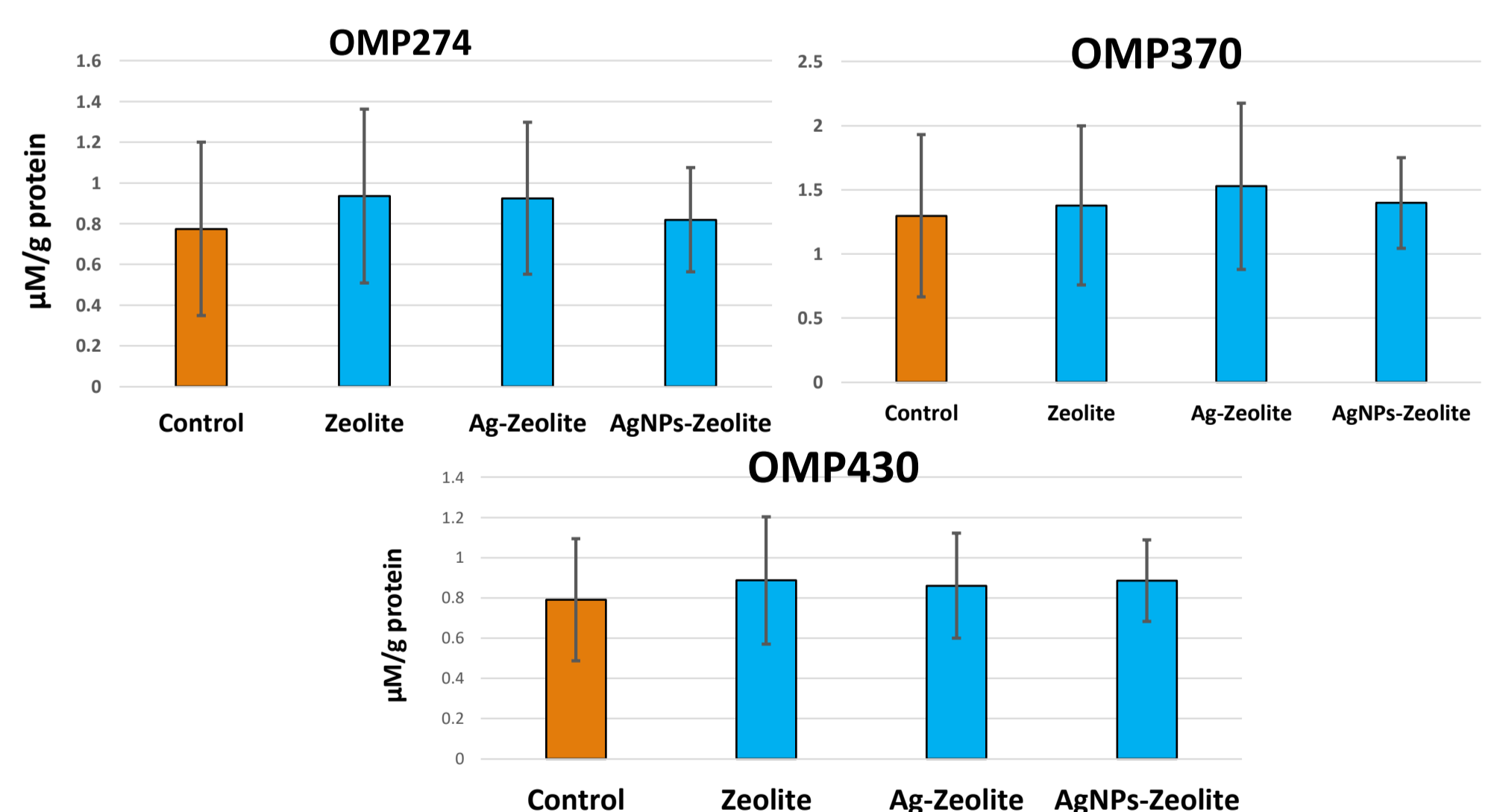
The best dynamics of wound healing were found in groups of animals treated with preparations based on zeolite and argentum (both metallic and in the form of nanoparticles)



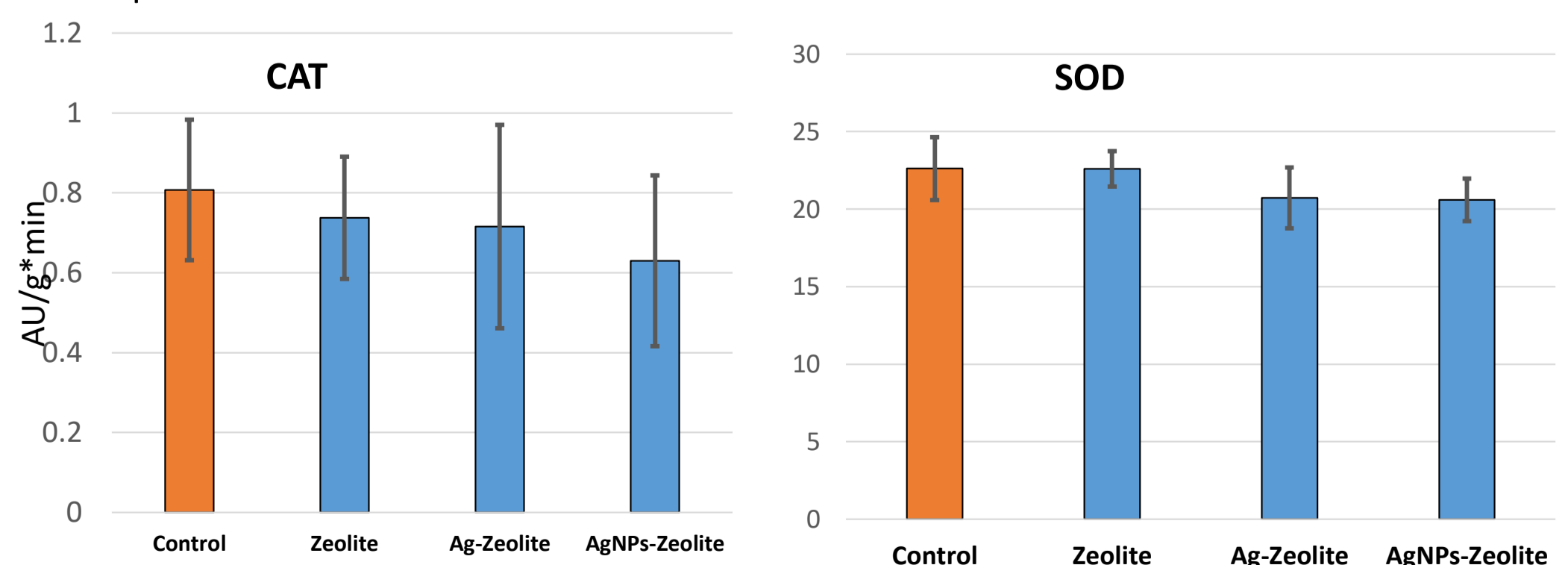
The concentration of MDA in the groups of animals treated with zeolite preparations with argentum was lower (with AgNPs, the difference is significant)



The positive effect of zeolite preparations with silver (both metallic and in the form of nanoparticles with chitosan) was characterized by a reduction in the inflammatory process in the tissue, an increase in the level of epithelialization, and the shedding of the dead layer



No differences were found in the content of carbonyl groups in acidic (OMP274), neutral (OMP370), and basic (OMP430) protein fractions in homogenates of affected tissues from the experimental animals.



No significant difference was found in the activity of the antioxidant protection enzymes SOD and CAT between the control and experimental groups in homogenates of affected tissues

**Conclusion.** Therefore, the clinoptilolite-argentum based preparations are effective for treatment of burn wounds in rats