The doctoral thesis is divided into two parts – Thermal analysis in physics education on high school and Material research of Al–Zn–Mg(–Cu–Sc–Zr) alloys. Within the first part, the areas of crystallization and/or melting of selected foods were determined using differential scanning calorimetry.
A practical lesson for high school physics has been created and tested. The study text focused mainly on differential scanning calorimetry and its use was made. In the second part of the doctoral thesis, there was analysed thermal evolution of the phase transformation in the Al–Zn–Mg(–Cu) alloys with Sc and Zr addition. The effect of (cold and hot) deformation on the decomposition sequences was studied. The hardening effect after annealing above 300 °C in the Sc and Zr alloys is caused by the precipitation of the secondary Al_3Sc,Zr) particles. These particles were observed by transmission electron microscopy after annealing up to 360 °C in all studied AlZnMg(Cu)ScZr alloys. In the AlZnMgCu alloy the partial recrystallization was observed after annealing at 350 °C/10 hours and after annealing at 450 °C/10 hours the grain size was 50–200 μm (depending on the treatment of the alloy). The addition of Sc, Zr in the AlZnMgCuScZr stabilizes grains and there is no recrystallization in the AlZnMgCuScZr alloy at temperature 450°C/10 hours.