

Musical Science: Chemistry of Historic Organ Pipe Materials

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Using Chemistry to Preserve Historic Pipe Organs



Across Europe, historic pipe organs are suffering from corrosion that destroys their pipes and prevents them from sounding. One such organ, built in 1636 in Lübeck, Germany, is pictured at left along with a close-up of a damaged pipe.

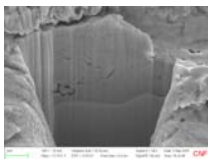


These organs – endangered species of the musical world – are valuable examples of pre-industrial artisanship and technology. There is a role for chemists in determining the cause of this corrosion and how it may be prevented.

Photos courtesy of Ibo Ortgies, Göteborg Organ Art Center

Our research approach involves a combination of analysis of historic samples and laboratory simulations in which new samples are exposed to corrosive conditions.

A corroded pipe from a 1770 Italian organ (right) has been analyzed using x-ray diffraction, SEM/EDX, and optical microscopy.



An SEM image (left) of an FIB-milled cross-section in a sample exposed to acetic acid vapor shows the interface between the metal and the corrosion layer. Ongoing studies aim to correlate metal composition and microstructure to the location of corrosion attack.

K-12 Outreach: Science of Musical Sound

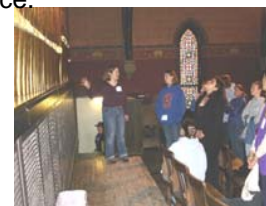
An understanding of the properties of sound waves – their wavelengths, frequencies, and the pitches they produce – is a national and New York State learning standard. The newly developed “Pipes You Can Play” module involves middle school students in a hands-on activity that introduces these ideas while highlighting the connections between music and science.



Students make (left) and play (below) panpipes from PVC pipe.



Above, a graduate student volunteer helps students use an oscilloscope to see a panpipe's sound waves.



Students see the same principles at work in their own instruments (above) and in Cornell's historic Sage Chapel organ (left).



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